SECTION 5

RESULTS AND DISCUSSION

This section summarizes the sampling and field monitoring results for the Control, FLB and AALB study units. Discussion of these results is provided herein, with supporting statistical analysis included as Appendix C. Monitoring activities began in June 2001 in accordance with the methods described previously in Section 4. The data documented herein are for the period from cell initiation through April 2003.

DATA VALIDATION

Three independent Data Validations have been performed for all critical and non-critical analysis of leachate, landfill gas (LFG), Municipal Solid Waste (MSW) and settlement parameters. On the basis of these audits, the data was amended as necessary. The data included in this report has been subject to this independent validation, all observations and findings documented in the validation reports have been addressed in the data presented.

STATISTICAL ANALYSIS

It is the intention of this project to use statistical methods to evaluate and compare data trends identified by the extensive parameter monitoring program. Given the immature status of the project and the present temporal non-correlation discussed previously, it would be premature to fully explore any apparent trends observed in the data collected so far for the purposes of this interim report. However, various statistical techniques were investigated and applied to some of the data collected to date, in order to assess the most appropriate method of displaying the results and evaluate the techniques for future application.

For a full account of the statistical techniques applied see Appendix C. In summary, data was expressed in Time Plots or, where more appropriate, Box Plots or Histograms. Although not applied in the following section, best fit curves were provided in the statistical evaluation of the leachate Time Plots. Levelplot of Settling Height Change (LOESS) or “contour” plots were applied to the GPS settlement data for qualitative purposes only, no rigorous statistical analysis was performed on this.

Statistical methods were then evaluated as a means to detect any statistically significant trends and slope estimates. For the leachate parameters the Mann-Kendall test was applied, and for the waste settlement the Shapiro Wilk Normality Test and Wilcoxon Rank Sum Test were evaluated.

Analysis of covariance was performed for the leachate data between replicate pair cells. Each unit consists of two cells that are considered duplicates or replicates of each other.

- Control 7.3A is a replicate of Control 7.3B
- FLB 5.1A is a replicate of Control 5.2B
- FLB 5.1B is a replicate of Control 5.2A
- AALB 7.4A is a replicate of AALB 7.4B

This set-up ensures that any apparent trend seen in a given cell can be evaluated against that seen in a similar, duplicate cell exposed to similar operational conditions, which theoretically therefore should behave in the same manner.

The statistical analysis techniques applied here did not reveal any statistically significant trends, it did, however, identify significant outliers which affected the statistical analyses. These results were not unexpected and supported the assertion that it was somewhat premature to assume a model structure for the many parameters given the limited data currently available. The heterogeneous nature of the patterns seen for many of the parameters do not yet give rise to a common model that can be used to make comparisons. The following section presents and summarized the data so far, without offering in depth statistical evaluation.

SUMMARY OF PERIODS OF LEACHATE AND AIR ADDITIONS

The following Table 5-1 provides a timetable of the periods of leachate and air addition to the bioreactor treatment cells. Although included in this report for reference purposes only, this information will be used in future analysis of the data to correlate with any data trends identified and improve understanding of these systems.

TABLE 5-1. TIMETABLE OF LEACHATE AND AIR ADDITION

PERIOD	FLB 5.1	FLB 5.2	AALB 7.4A	AALB 7.4B
3/21/02 to 10/11/02	Fluid Addition			
2/16/02 to 10/11/02	Fluid Addition	Fluid Addition		
6/18/02 to 7/4/02			Air Addition	Air Addition
7/15/02 to 7/27/02			Air Addition	Air Addition
7/30/02 to 8/12/02			Air Addition	
2/4/02 to 2/14/03			Air Addition	Air Addition
2/18/02 to 3/27/03			Air Addition	Air Addition

Note: Liquid Addition to the AALB cells is essentially continuous beginning with installation of the first lift of waste in each cell.

WASTE VOLUMES AND SETTLEMENT

Various parameters were measured to monitor waste volume changes over time and ultimately, waste settlement in each of the cells under investigation. The results documented in this report apply the Control Unit (7.3 A and B), the FLB (Unit 5.1A and 5.2B) and the AALB (Unit 7.4 A and B).

Summary of Waste Volume

Gross volume for in-place waste and other materials was measured for each of the cells on a quarterly basis using surveying techniques. This has been graphically represented in Figures 5-1, 5-2, and 5-3 for the Control, FLB and AALB, respectively.

Waste deposition in Control Cells 7.3 A and B began in late 1998. Both cells have been filled at approximately the same rate with 7.3A presently having the slightly greater volume of 655,165 m^3 versus 558,174 m^3. Initially the waste volume in both increased rapidly as waste was deposited, bringing the total waste volume in both cells to 1,022,136 m^3 by March 1999. Additional waste has continued to be deposited in both 7.3 A and 7.3 B resulting in a gradual increase in volume. By end of March 2003 there was 1,213,339 m^3 of waste in place. The trend is a result of the frequency and volume of waste deposited versus the rate of settlement and degradation of the waste, hence over certain periods a drop in volume is observed as the rate of settlement is greater than the rate of deposition. See Figure 5-1.

Waste deposition in FLB Cells 5.1 and 5.2 began in July of 1995. This landfill received a total of 1,930,825 tons of waste by October 1997. An additional 154,924 tons of waste were added between July 2000 and March 2001. No further waste has been deposited since that time and waste volume measurements for the period June 2001 through December 2002 show a steady decrease in each of the four subcells A, B, C and D. The volume reduction over the period represents a 2.5 percent decrease in A, 2.6 percent in B, 2.5 percent in C and 3.4 percent in D. See Figure 5-2.

Waste deposition in AALB units 7.4A and 7.4B began in July and September 2001, respectively. The waste volumes in place for both AALB units are showing an increase in waste volume over time because each continues to receive waste on a daily basis. By end 2001 there was 22,3971m^3 total waste in place in both cells, 680,947m^3 by end 2002, and 734,011m^3 by March 2003. See Figure 5-3.

Figure 5-1. Waste Volume vs. Time for Control Cells

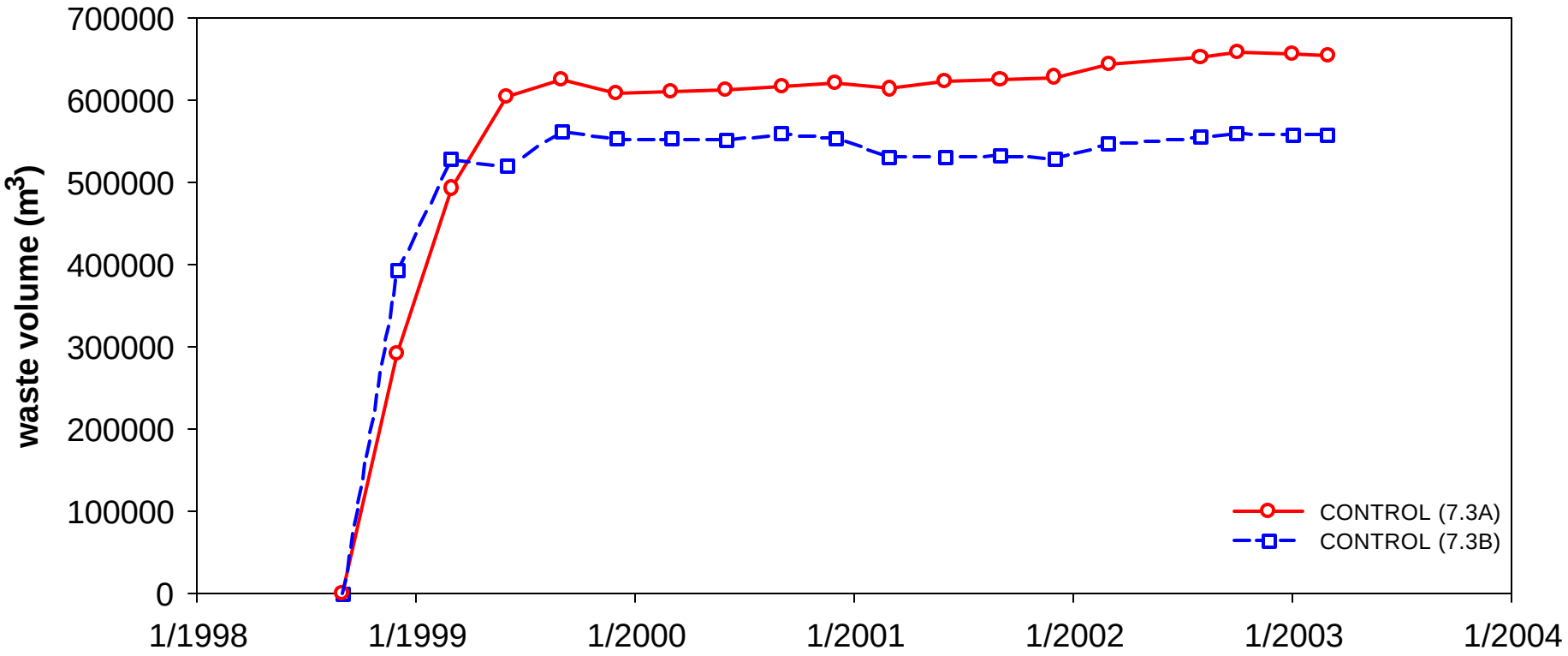


Figure 5-2. Waste Volume vs. Time for FLB Cells

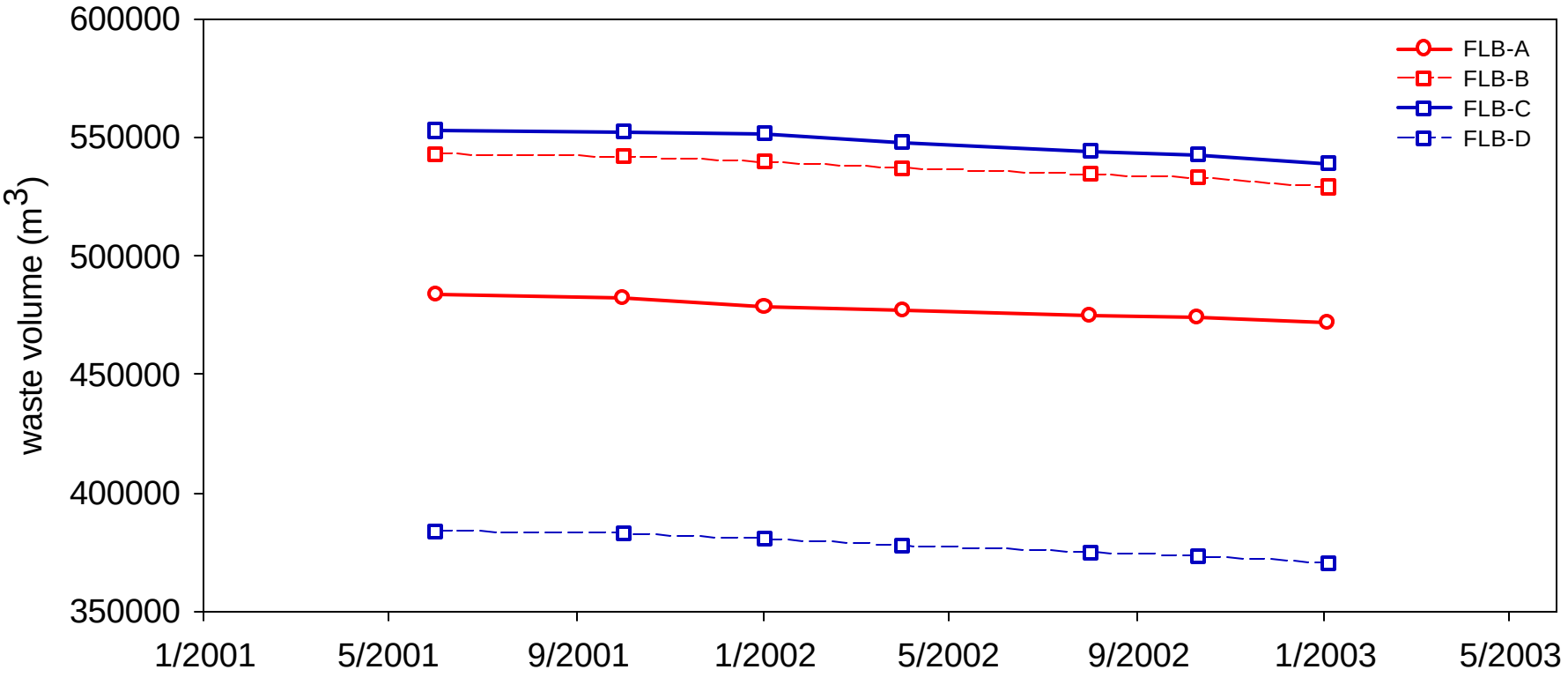
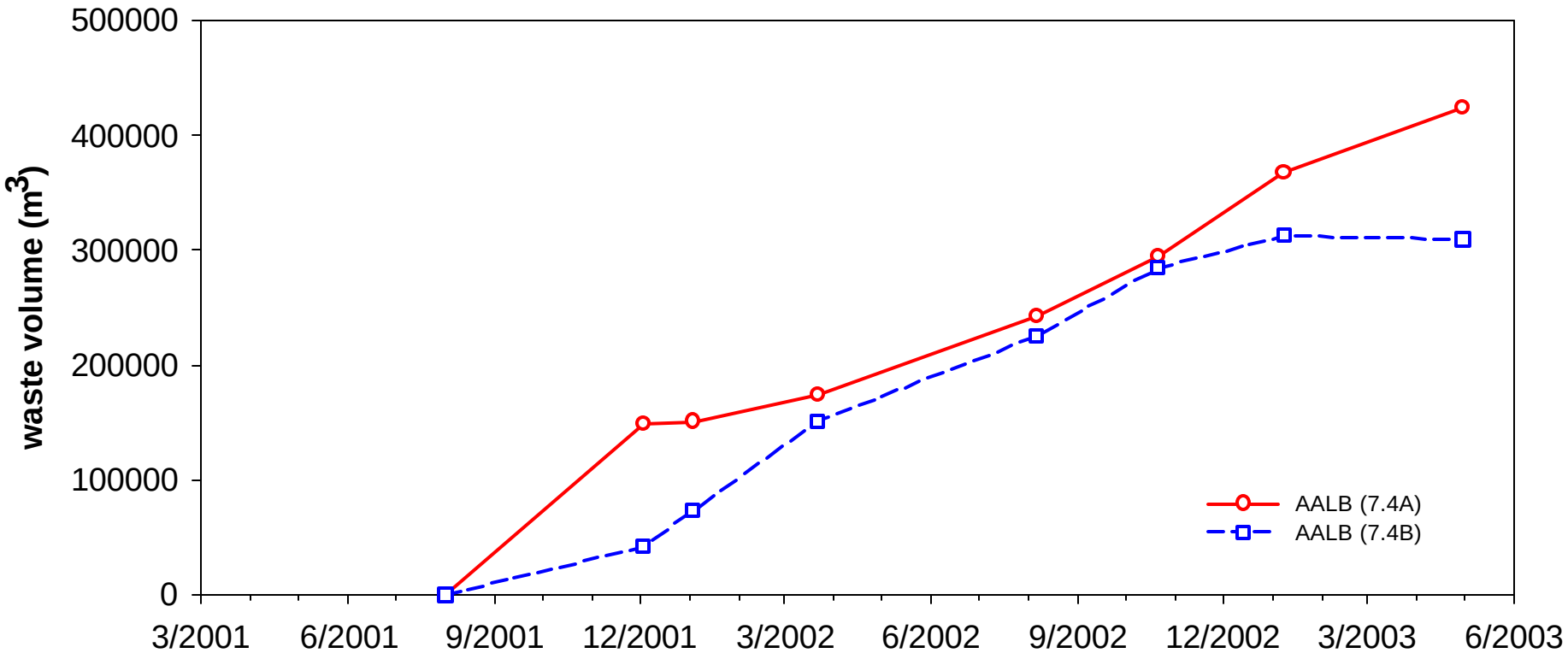


Figure 5-3. Waste Volume vs. Time for AALB Cells



Summary of Waste Settlement

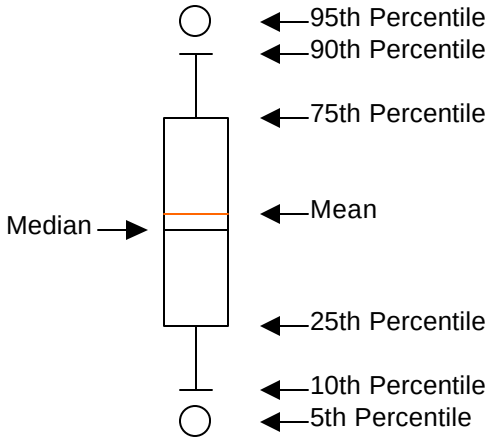
The surface elevation was measured using GPS technology for each of the Control, AALB and FLB units. The results are displayed in the form of a contour plot of total settlement for the period in the FLB, and box plots in Figures 5-4 through 5-7.

There are relatively fewer data points for Units 7.3 and 7.4 compared with Unit 5, with only three measuring events versus eight for Unit 5 FLB. In addition the significance of the GPS data relative to the objectives of this investigation for Units 7.3 and 7.4 is limited at this point owing to soil covering and active waste placement.

Unit 5 is not actively accepting waste. The last waste addition was made in 2000-2001. Relatively more of this waste was placed in the southeastern part of this Unit compared with the northern half. The GPS data for this region of Unit 5 shows a generally greater settlement (decrease in surface height) over the period, as would be expected. The box plot for FLB 5.1A also demonstrates a greater rate of settlement, decreasing with time, compared with FLB 5.2B that shows a much more consistent and lower degree of settlement.

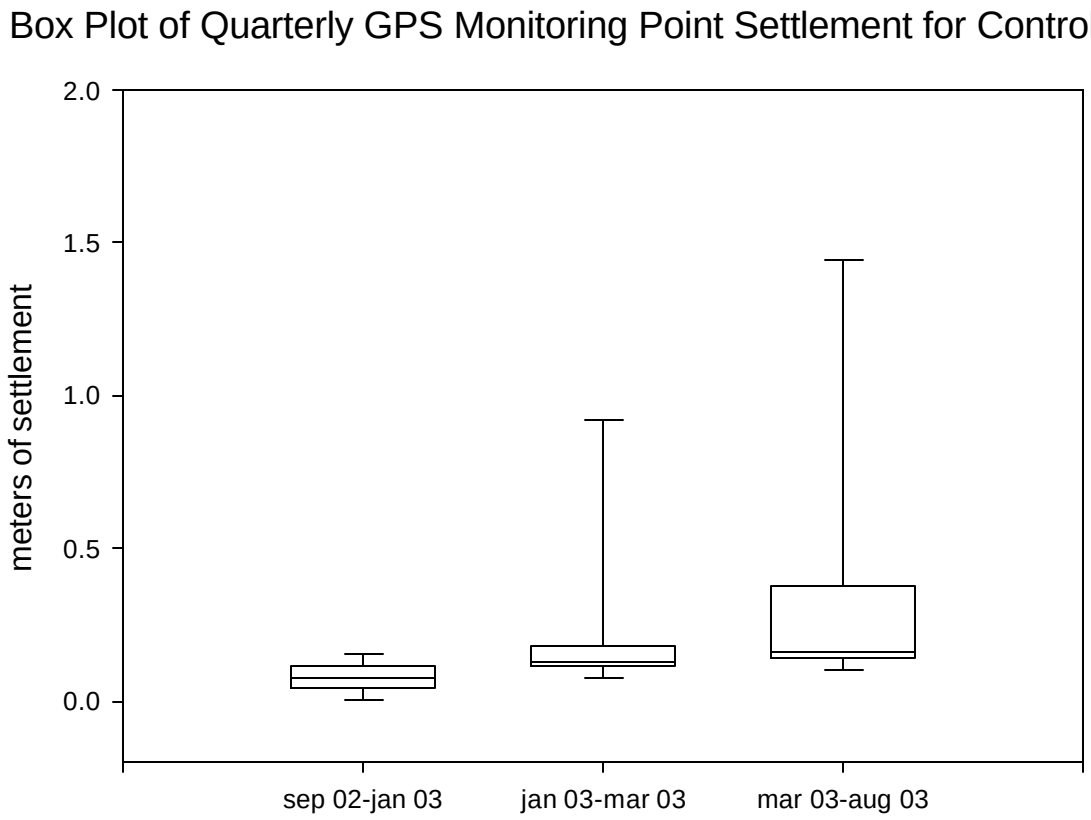
The maximum average settlement displayed in the box plots is approximately 0.2m. When this is compared with the data spread of approximately 0.3m for that period, it can be concluded that a greater degree of settlement is required to derive meaningful results from this measurement. Longer-term elevation measurements should provide greater clarity and confidence in this parameter.

Interpretation of the Box Plot:



Insufficient data, overlap in waste age, and continued disturbance of the landfill surface may confound conclusive trends at this interim stage.

Figure 5-4. GPS Settlement Data for Control



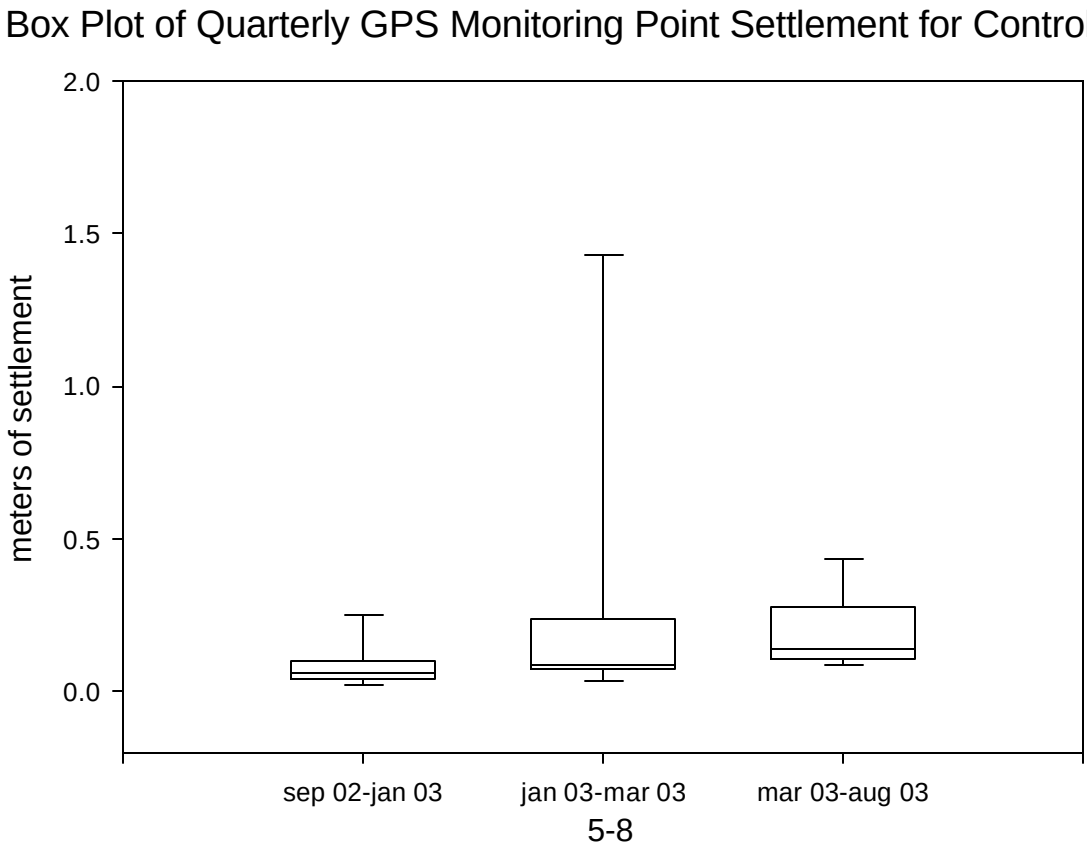
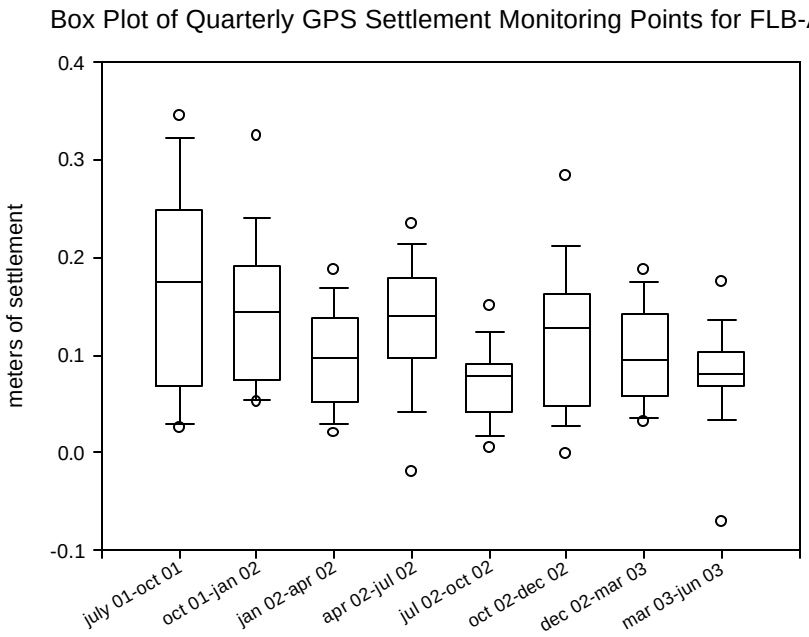
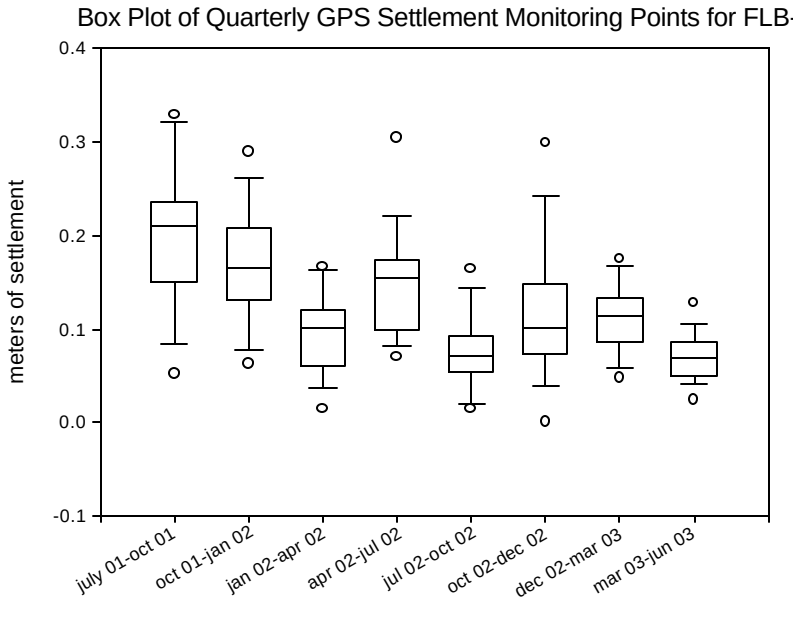
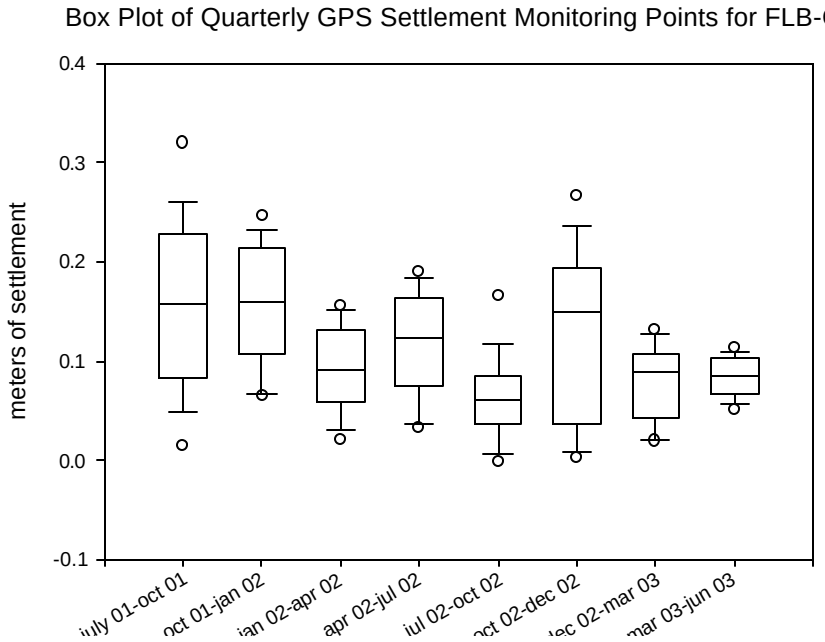


Figure 5-5. GPS Settlement Data for FLB







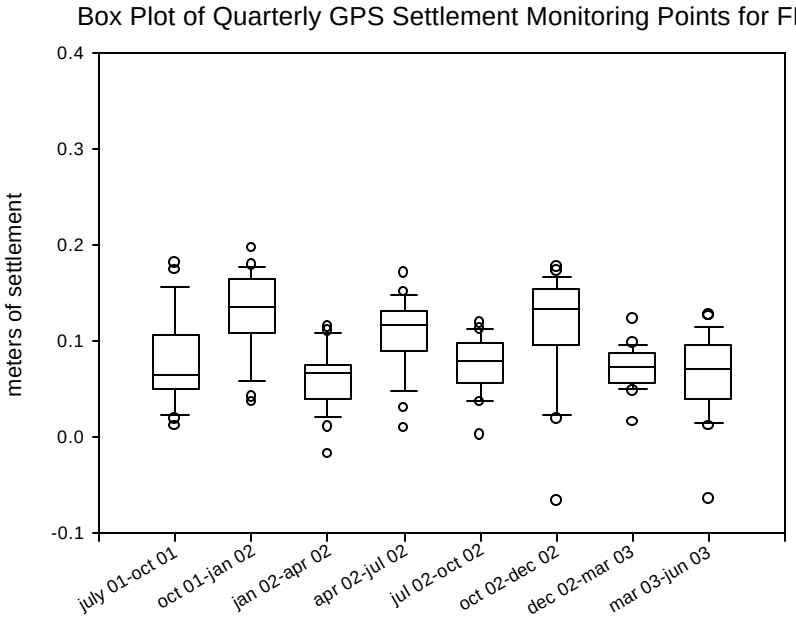


Figure 5-6. Plan View Contour Plot of Settlement for FLB GPS Monitoring Points (6/2001 -6/2003)

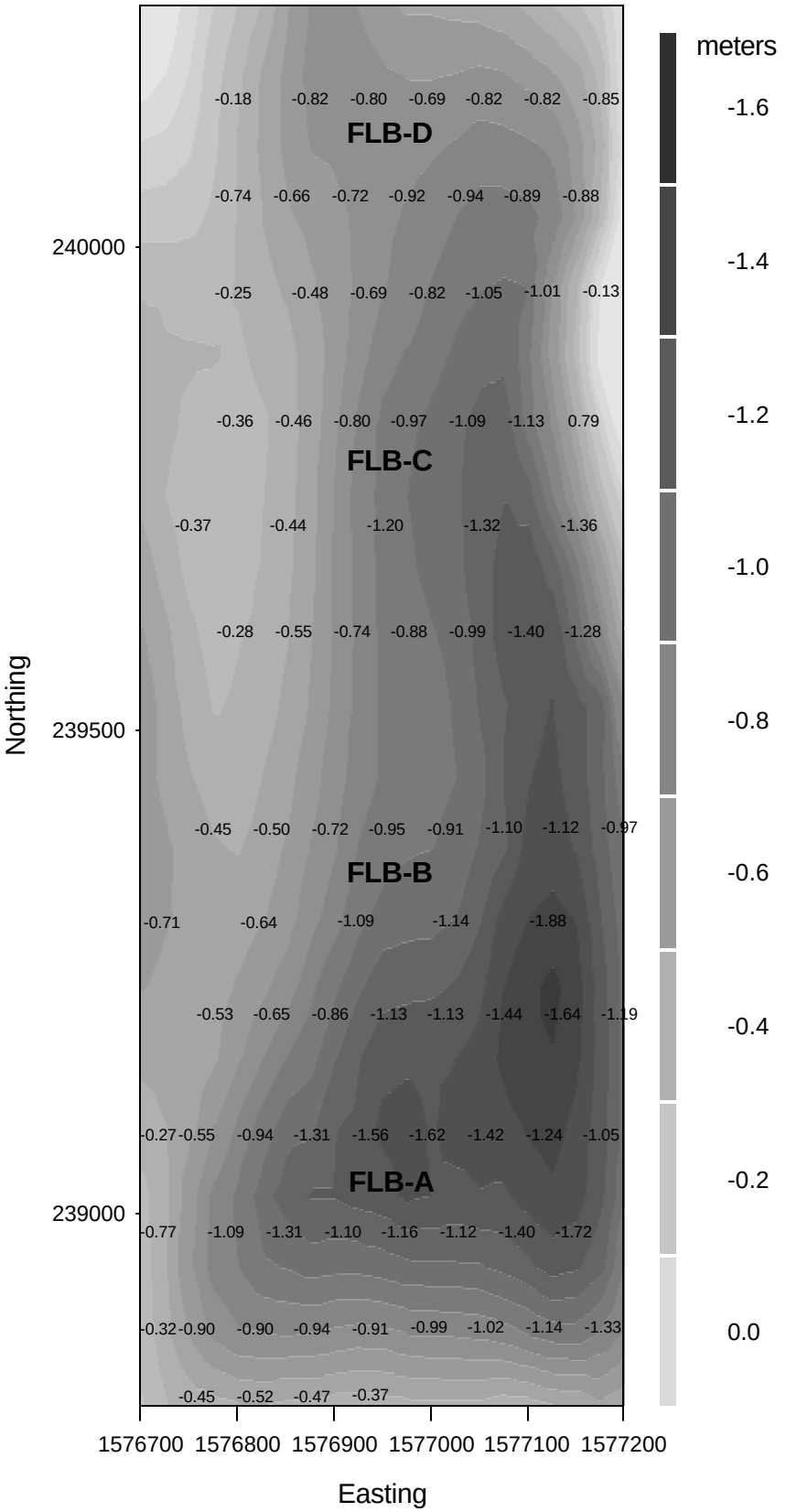
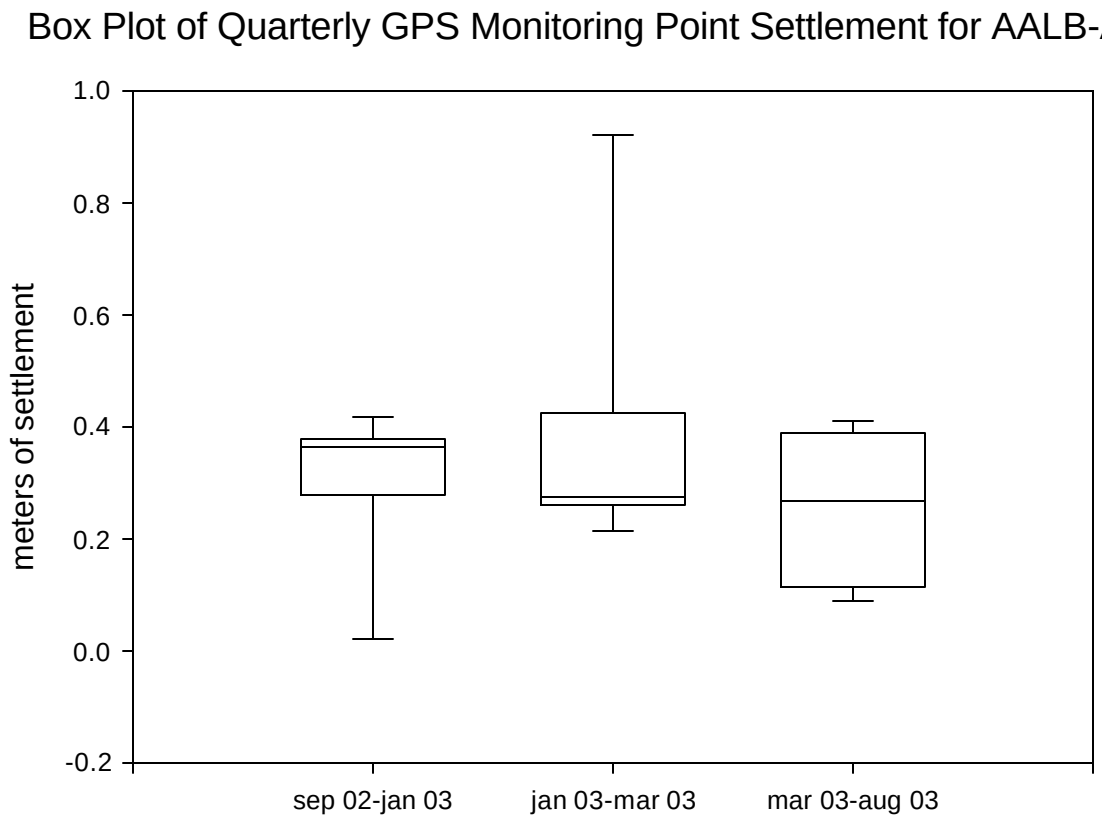
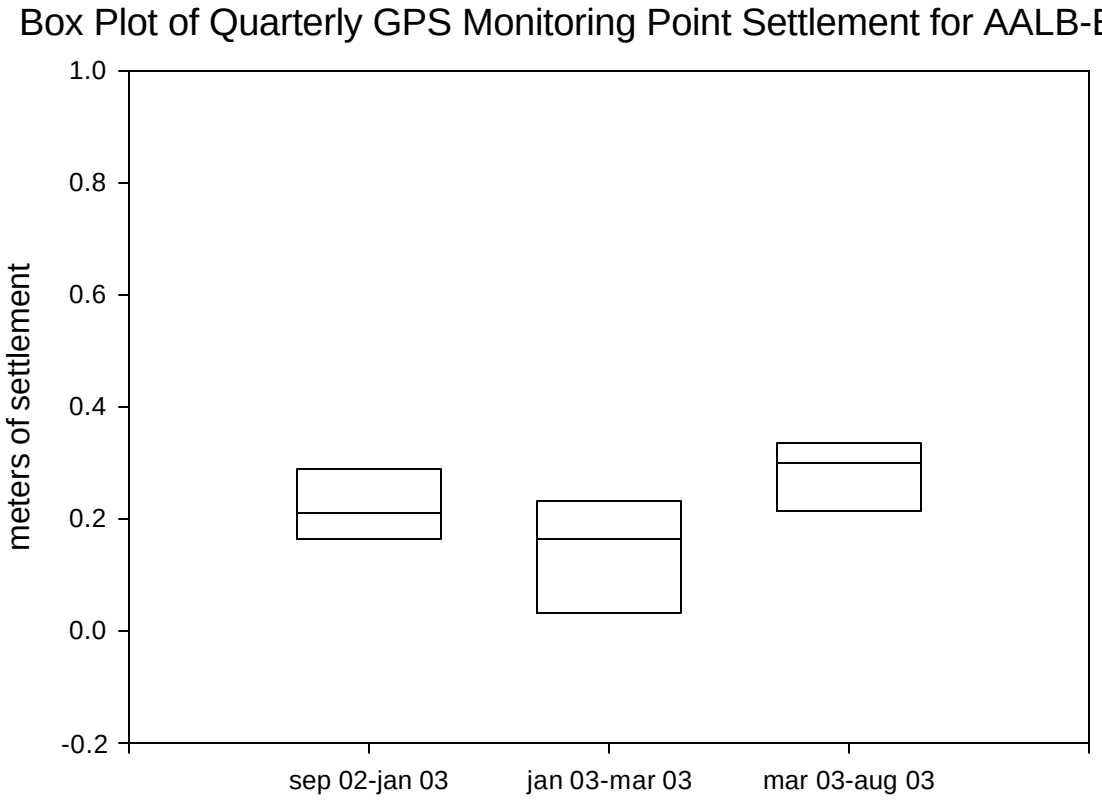


Figure 5-7. GPS Settlement Data for AALB





Airspace Utilization Factor (AUF)

In addition to waste settlement data, landfill operators use comparisons of calculated densities as a means to benchmark the use of the airspace created during development and filling of the landfill cells over time. Such comparisons require volume or weight data to calculate an in-place density of as-received materials. Depending on the calculation desired, these materials may be limited to simply waste, or other materials may be added in as well, such as cover materials, construction materials, moisture additions, and the like. At the Outer Loop facility, these comparisons are termed the Airspace Utilization Factor (AUF) and are calculated as follows:

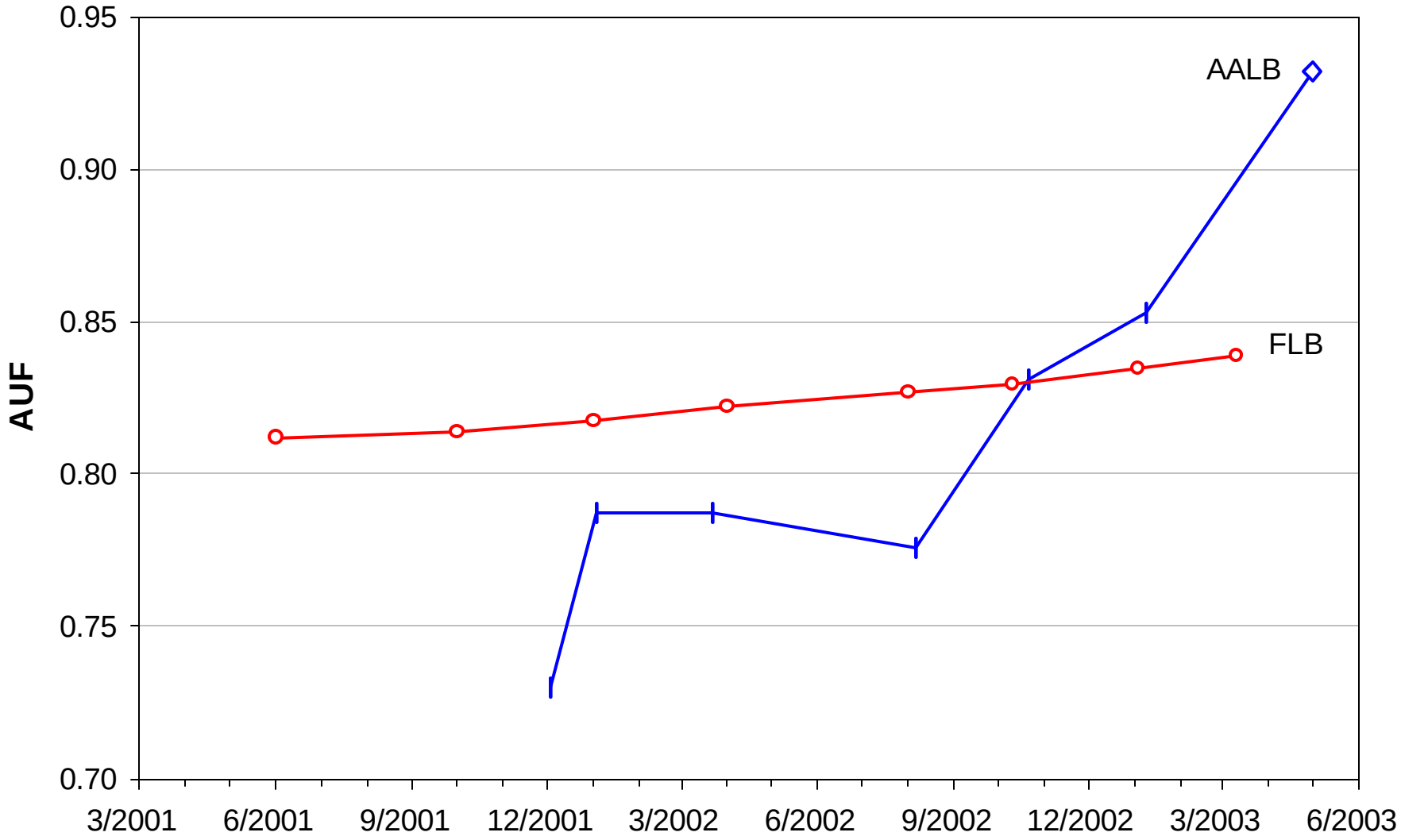
$$AUF = \frac{\text{Calculated In-Place Cell Density (weight, as received waste lbs/cell volume, } yd^3)}{\text{Target cell Density (set at 2000 lbs/cubic yard)}}$$

Where

- the weight of as-received waste materials is from scalehouse data
- the overall volume of the cell is estimated using GPS or other periodic survey methods
- Target Cell Density is a constant
- AUF is unit-less.

Figure 5-8 depicts changes in the AUF values as calculated for the FLB and AALB cells (combined) over time. Note that the AUF for the FLB is somewhat constant, rising slowly with time, as opposed to significant rises in AUF shown for the AALB. The FLB no longer receives waste materials; however, its cell volume is decreasing with time due to settlement. This accounts for the increase in the calculated in-place density. The rising plot for AALB is a function of the ongoing receipt of wastes and the likely occurrence of waste settlement.

Figure 5-8. Airspace Utilization Factor (AUF) vs. Time for FLB and AALB



LEACHATE QUALITY AND CHARACTERISTICS

As described in previous sections, leachate analyses have been taken to evaluate changes in leachate quality with respect to the program design treatments. Changes in leachate parameters are expected to broadly represent the changes in the MSW. For example, the impact of nitrified effluent applied to the FLB Landfill in Unit 5 and subsequent denitrification should impact the overall mass balance of nitrogen as the nitrogen is converted to nitrogen gas. The data collected for COD, BOD, ammonia nitrogen, nitrite-nitrogen, and nitrate-nitrogen, as well as leachate quantification (e.g., production, and head on liner), will be examined further as the project progresses. The following represent summaries of the leachate data collected to date for the Control, FLB, and AALB units.

Summary of Leachate Head on Liner

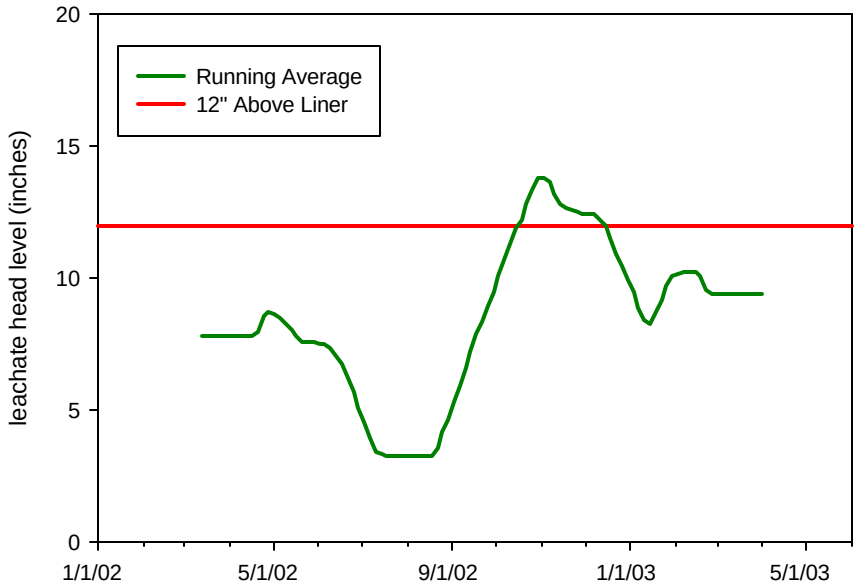
The head on liner values for the period March 2002 through March 2003 for the AALB, FLB and Control Units are presented in Figures 5-9 through 5-14. This parameter was included in this investigation to examine measured head on liner for both control and treatment cells. The data are presented in the form of scatter plots with running average lines, box plots, and histograms.

In general, mean head levels varied on an approximate seasonal basis, with significant changes occurring as a result of precipitation events. In addition, mean head levels remained at or below the permitted 12-inch level for the majority of the monitoring program. The exceptions to this were:

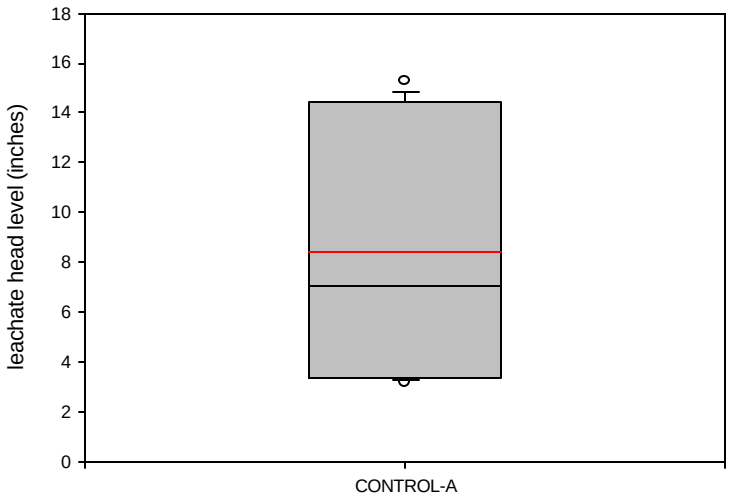
- "spikes" due to specific rainfall events;
- pumping impediments with Unit 5 relative to an apparent under capacity of the SBR; and
- pumping impediments with Unit 7 relative to an apparent under capacity of the leachate force main.

Elevated head levels attributable to precipitation events were managed with time with increased leachate pumping. With regard to the apparent under capacity of landfill bioreactor system elements, the need for increased pumping capacity was noted and examined in 2002. Design changes were determined and approved as part of the facility permit, including a planned expansion of the SBR tank and landfill cell pumping capacities. These improvements were under construction during early 2003 and are planned for completion in Autumn 2003.

Figure 5-9. Daily Mean Head Level for Control-A Cell



Box Plot of Daily Mean Head Level for Control-A Cell



Histogram of Daily Mean Head Level for Control-A Cell

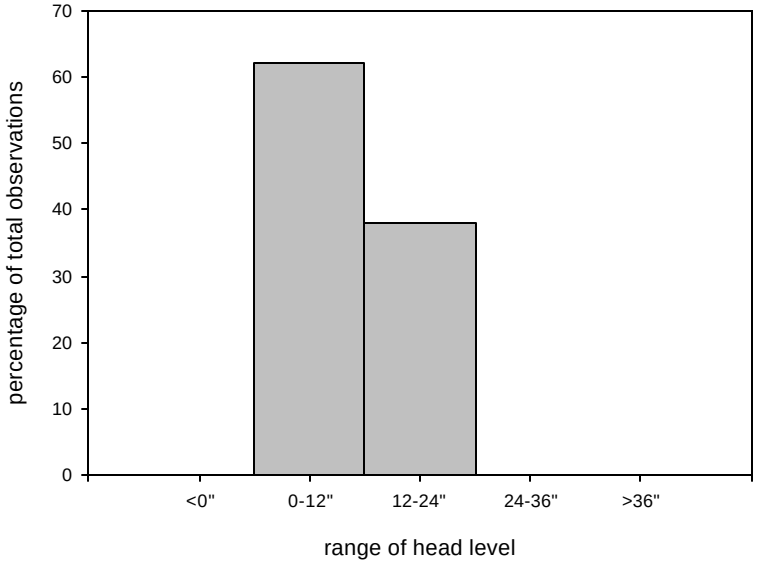
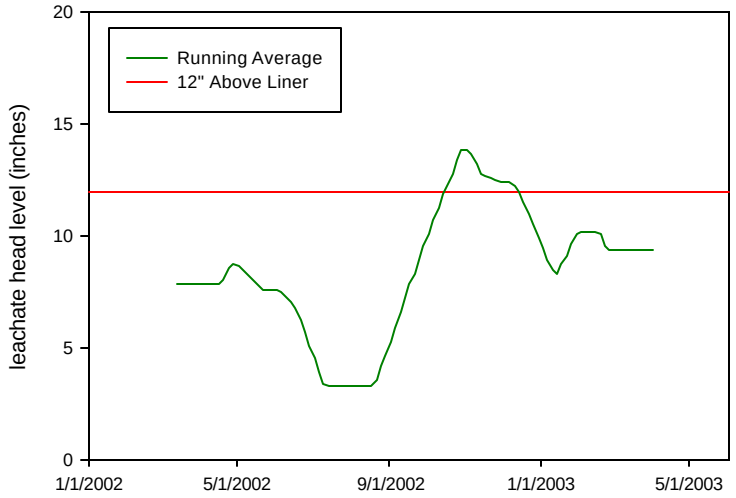
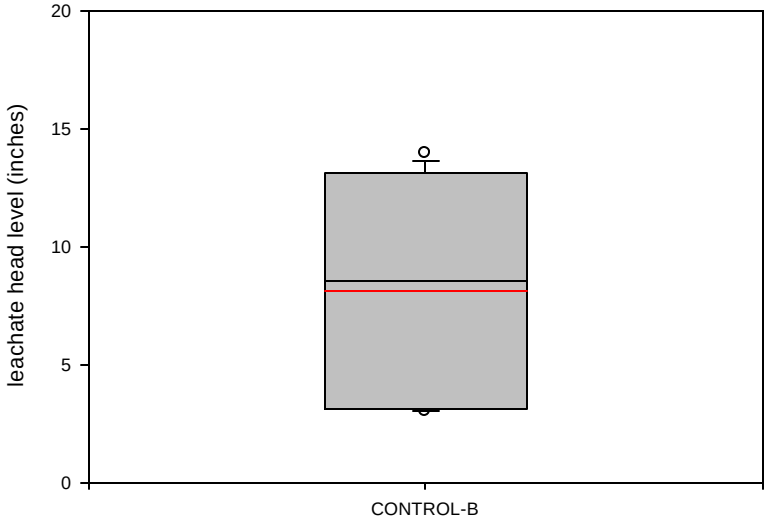


Figure 5-10. Daily Mean Head Level for Control-B Cell



Box Plot of Daily Mean Head Level for Control-B Cell



Histogram of Daily Mean Head Level for Control-B Cell

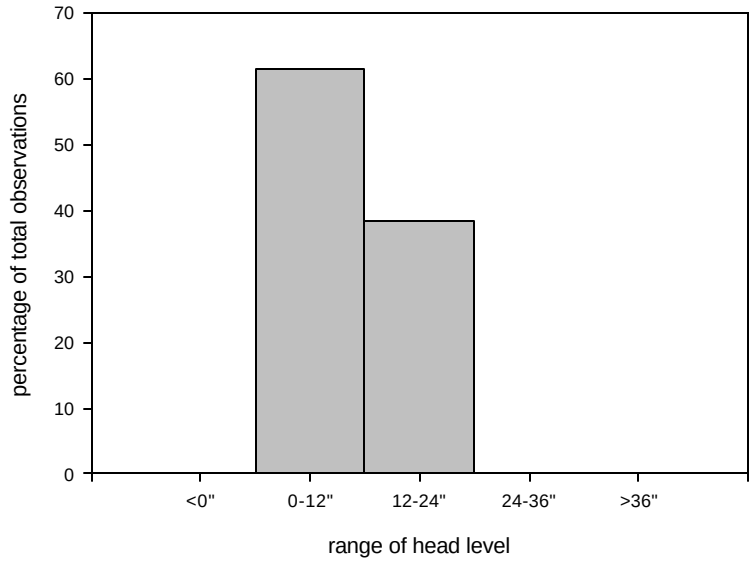
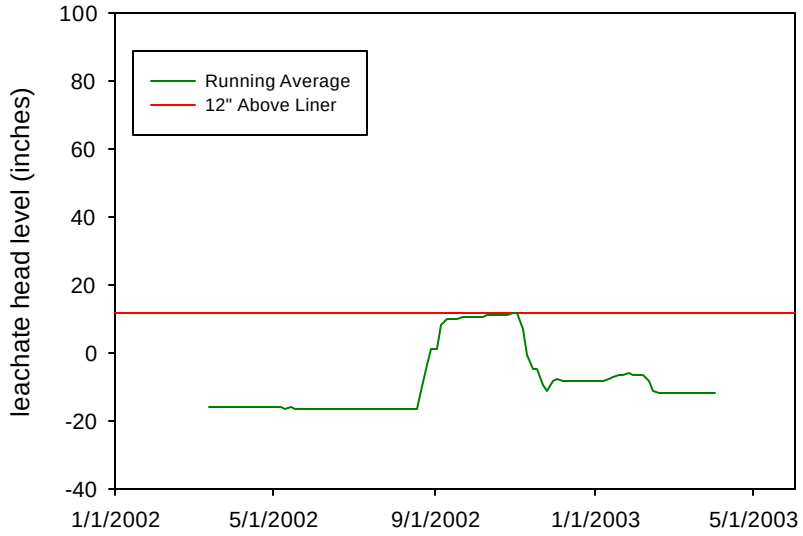
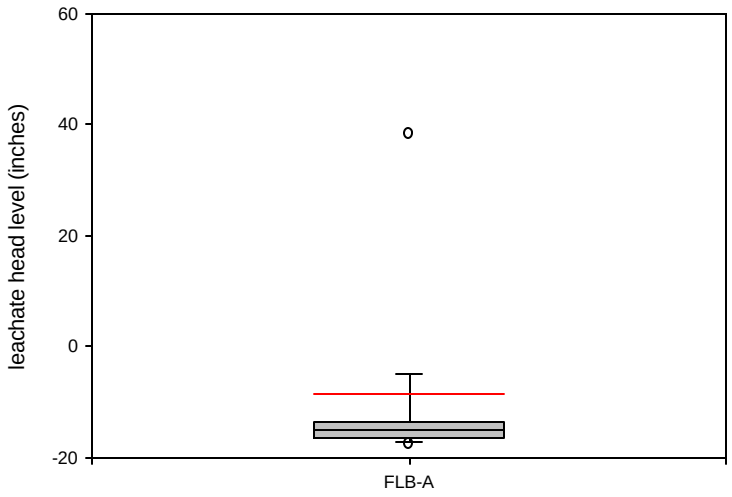


Figure 5-11. Daily Mean Head Level for FLB-A Cell



Histogram of Daily Mean Leachate Head Level for FLB-A



Histogram of Daily Mean Leachate Head Level for FLB-A Cell

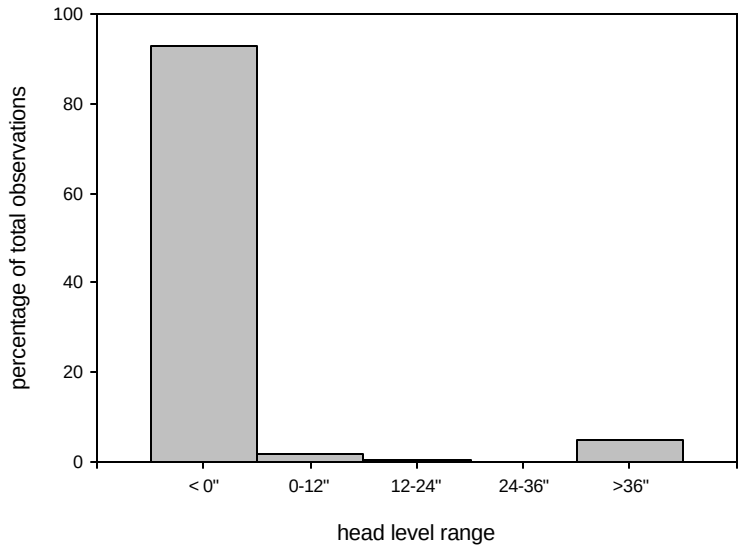
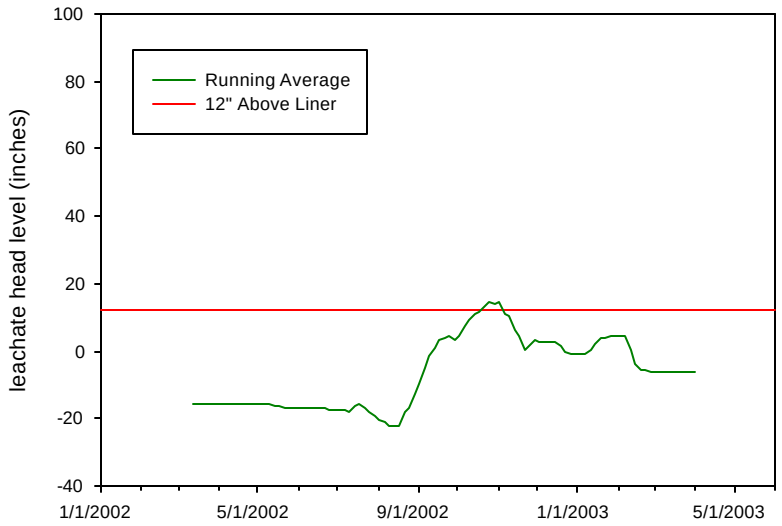
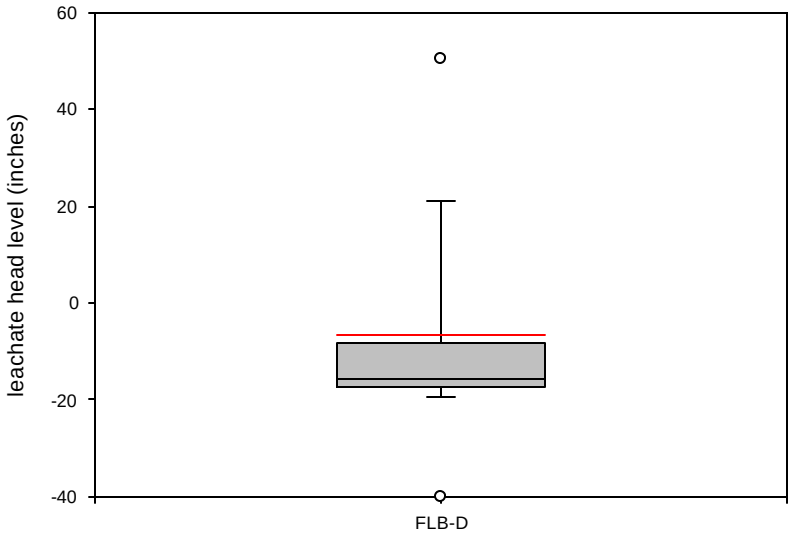


Figure 5-12. Daily Mean Head Level for FLB-D Cell



Histogram of Daily Mean Leachate Head Level for FLB-D



Histogram of Daily Mean Leachate Head Level for FLB-D Cell

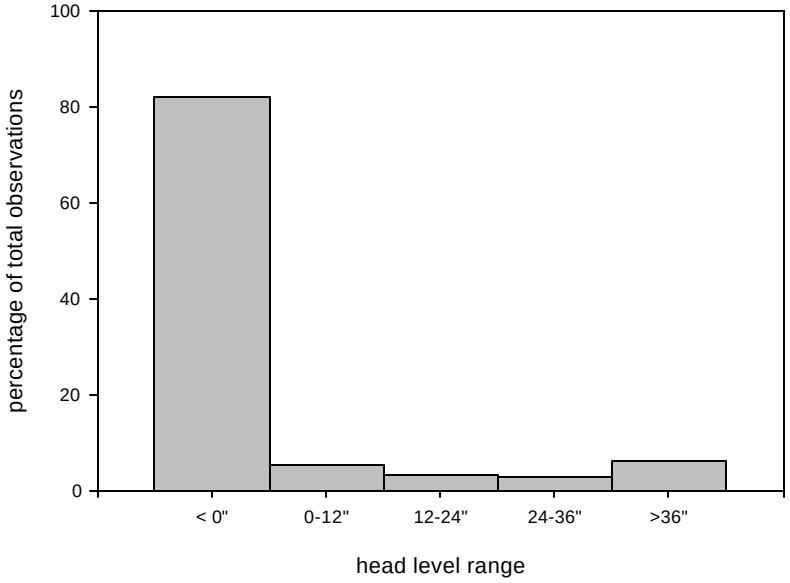
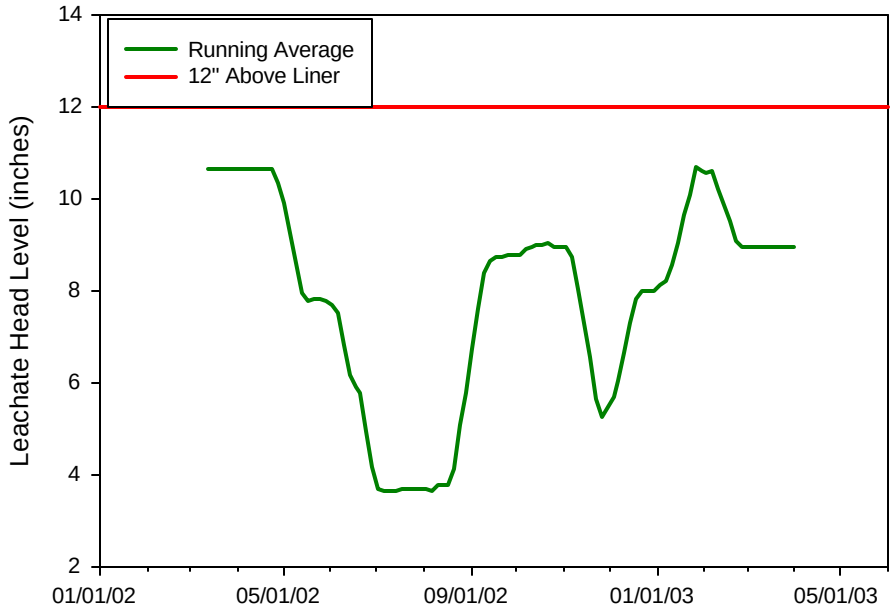
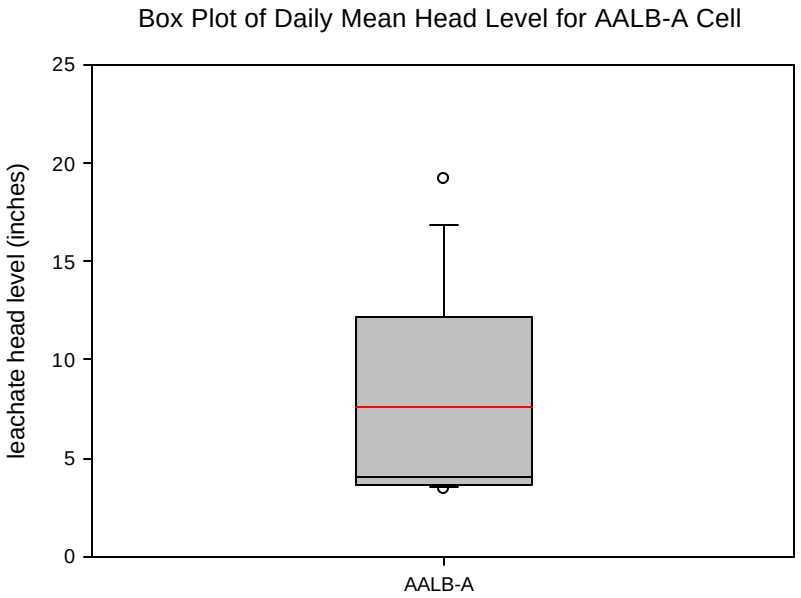


Figure 5-13. Daily Mean Head Level for AALB-A Cell





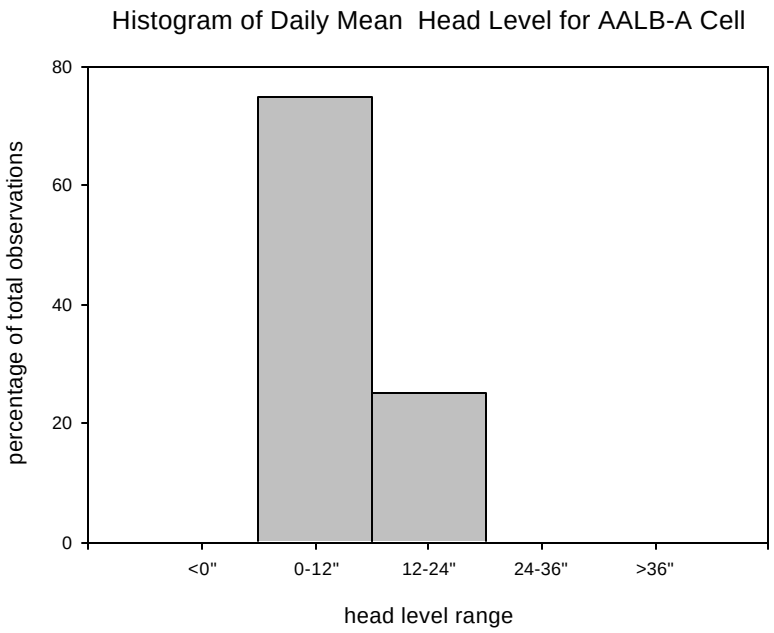
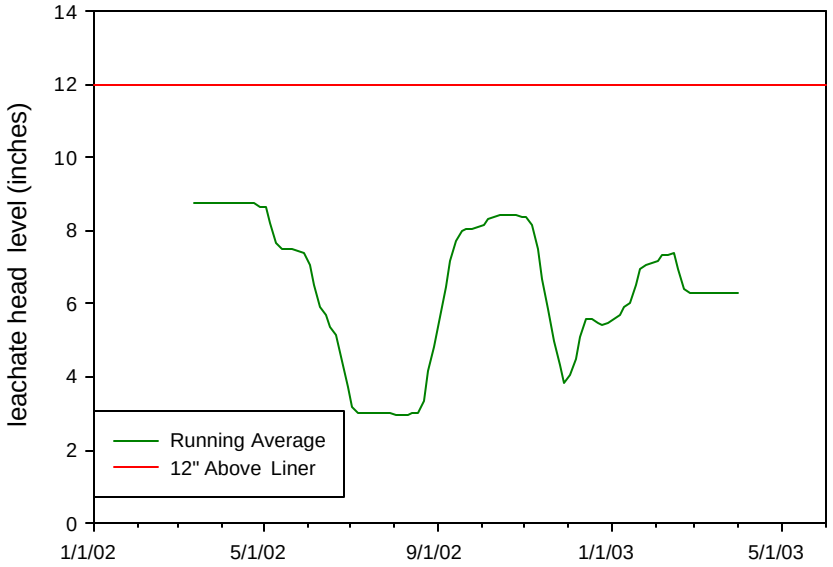
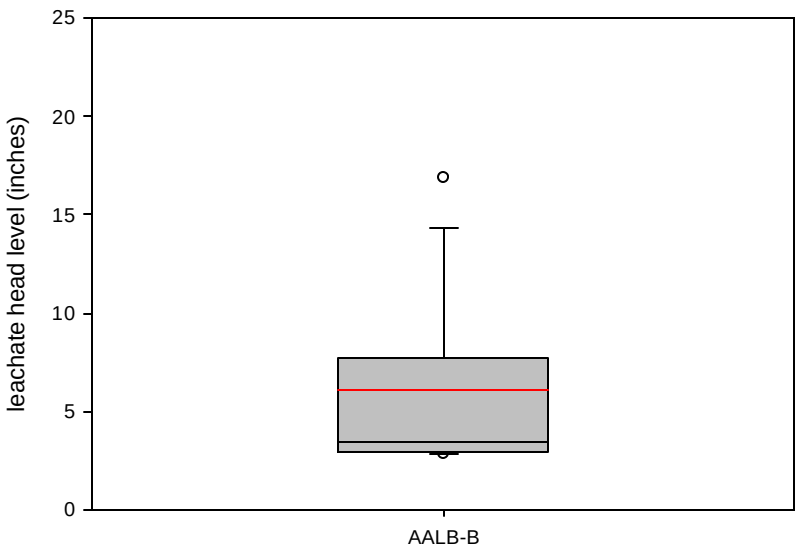


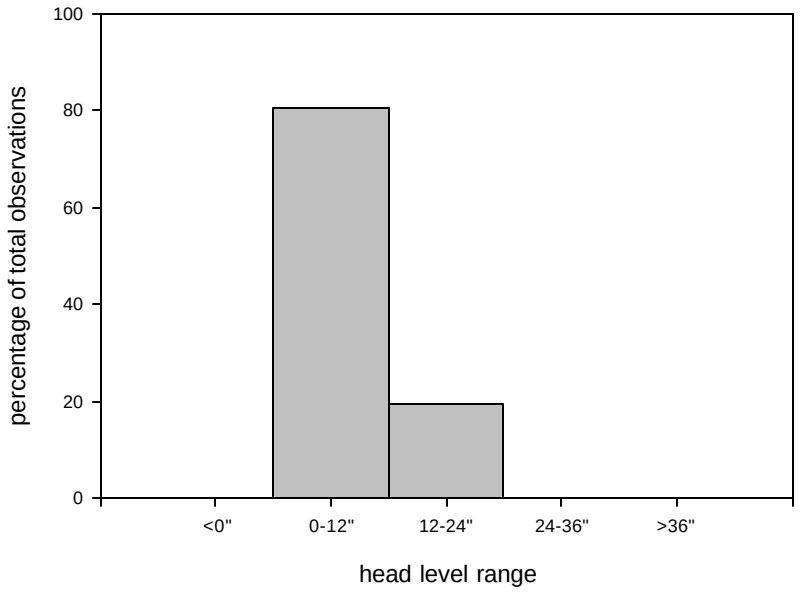
Figure 5-14. Daily Mean Head Level for AALB-B Cell



Box Plot of Daily Mean Head Level for AALB-B Cell



Histogram of Daily Mean Head Level for AALB-B Cell



Summary of Leachate Production

Cumulative leachate production is measured for each of the study cells, Control, FLB, and AALB. Measurements are taken on a continuous basis at half-hour intervals via a totalizer flow meter. The cumulative leachate production with time for each of the Units is presented in Figures 5-15 through 5-17.

The Control cells are operated as a conventional Subtitle D landfill with no additional fluids added. The rate of accumulation of leachate in Control 7.3A remained relatively steady over the period March 2002 through March 2003 averaging approximately 700m^3/month, with a total accumulated volume over the period of ~9,000m^3. Spikes in the rate of accumulation represent significant rain events. Control 7.3B showed a much lower rate of leachate production, accumulating only approximately 400m^3 for that same period. One potential explanation for this difference is that Control A has significantly less surface area exposed than Control B. Therefore it has a much smaller precipitation catchment area relative to the footprint of that cell compared with Control B.

The FLB Unit 5 is not currently active with the last waste received in March 2001. Nitrate enriched leachate addition was initiated in March 2002 and ceased in September 2002. Leachate production in these cells is lower than that of both the AALB and the Control. Both cells 5.1A and 5.2B showed a relatively steady rate of leachate production from January 2002 until mid-September 2002, at approximately 100 and 155m^3/month respectively. From mid-September through October 2002 a dramatic increase in leachate production was seen with ~1100m^3 produced in 5.1A and ~1400m^3 produced in 5.2B. From November through March 2003, there was a relatively constant rate of leachate production in both cells of 240m^3/month.

One potential explanation for the increase in leachate production from mid-September through October 2002 may be a time lag on the order of approximately six months for the additional fluids added to permeate through the landfill. These moisture quantities did not start appearing at the collection point until mid-September. The additional leachate produced at that time may have been a combination of both the additional fluids added and a consequence of heavy rainfall during the Spring period. One other explanation, or an additional part of the explanation, was that boring samples were taken in September 2002. The bore holes were back filled with permeable tire chips in order to create direct conduits for fluid to pass through the landfill and avoid perched liquids as were observed during the boring activity.

The AALB units are currently receiving waste and contain the youngest waste of all three units in the study. Additional fluids are added to this bioreactor on an ongoing basis as successive lifts of waste are placed. Both cells showed a steady rate of leachate production for the period March 2002 through March 2003. In both cells, the rate of leachate production was an order of magnitude higher than either the FLB or control at 4000m^3/month for 7.4A and 2500m^3/month for 7.4B. The total leachate accumulate over the period was 52000m^3 in 7.4A and 30000m^3 in 7.4B.

Figure 5-15. Cumulative Leachate Production vs. Time: Control Cells

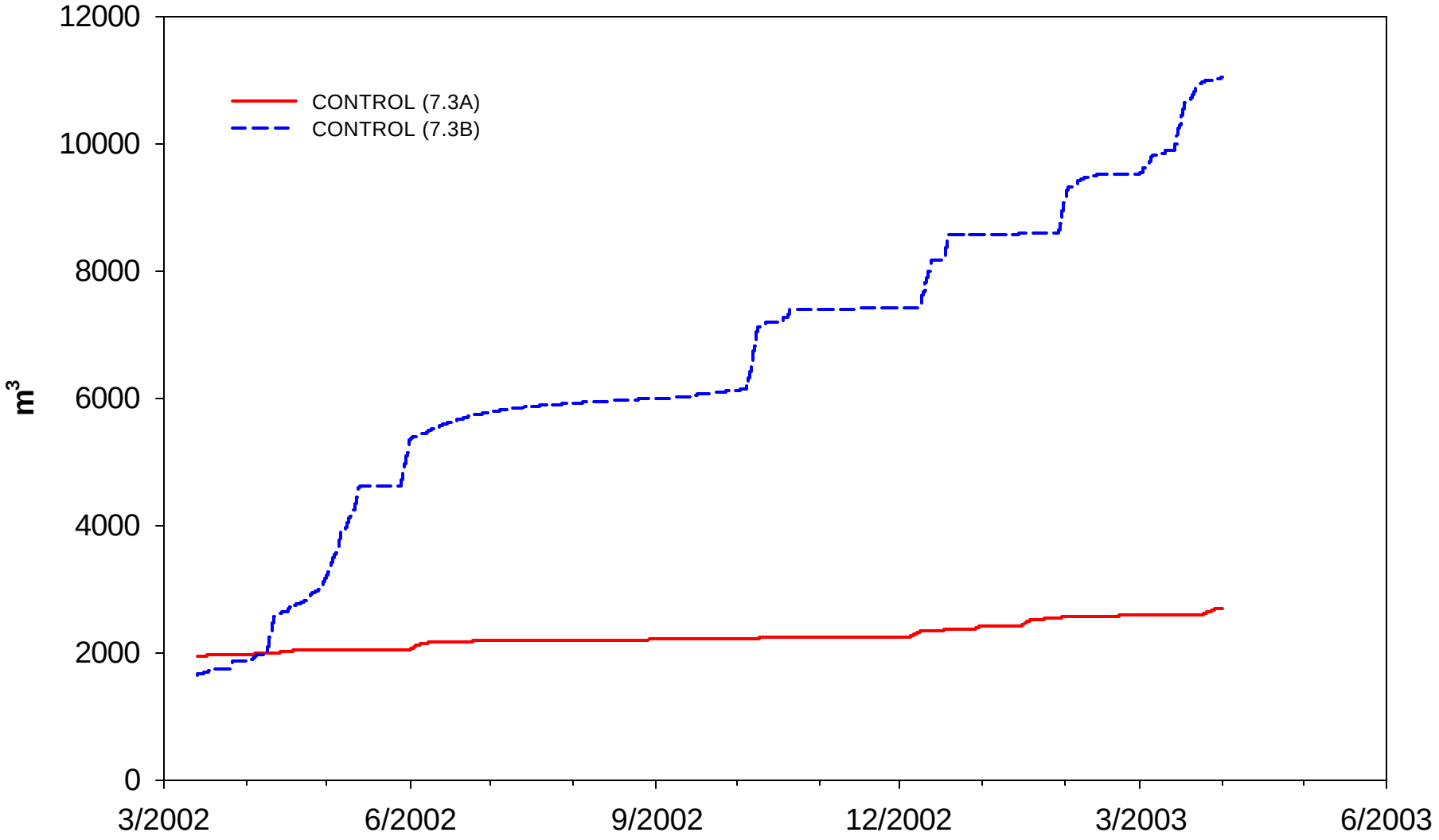


Figure 5-16. Cumulative Leachate Production vs. Time: FLB Cells

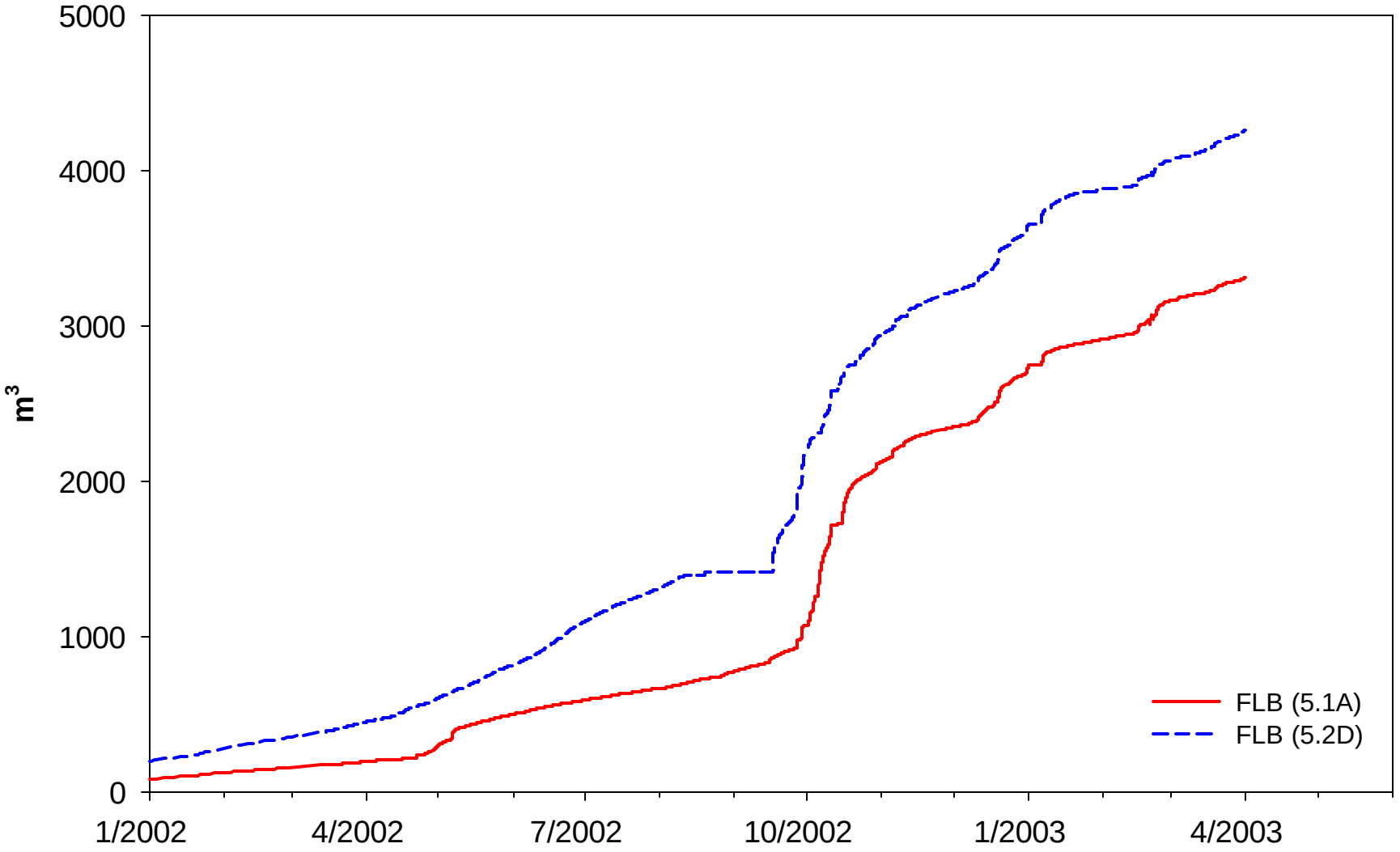
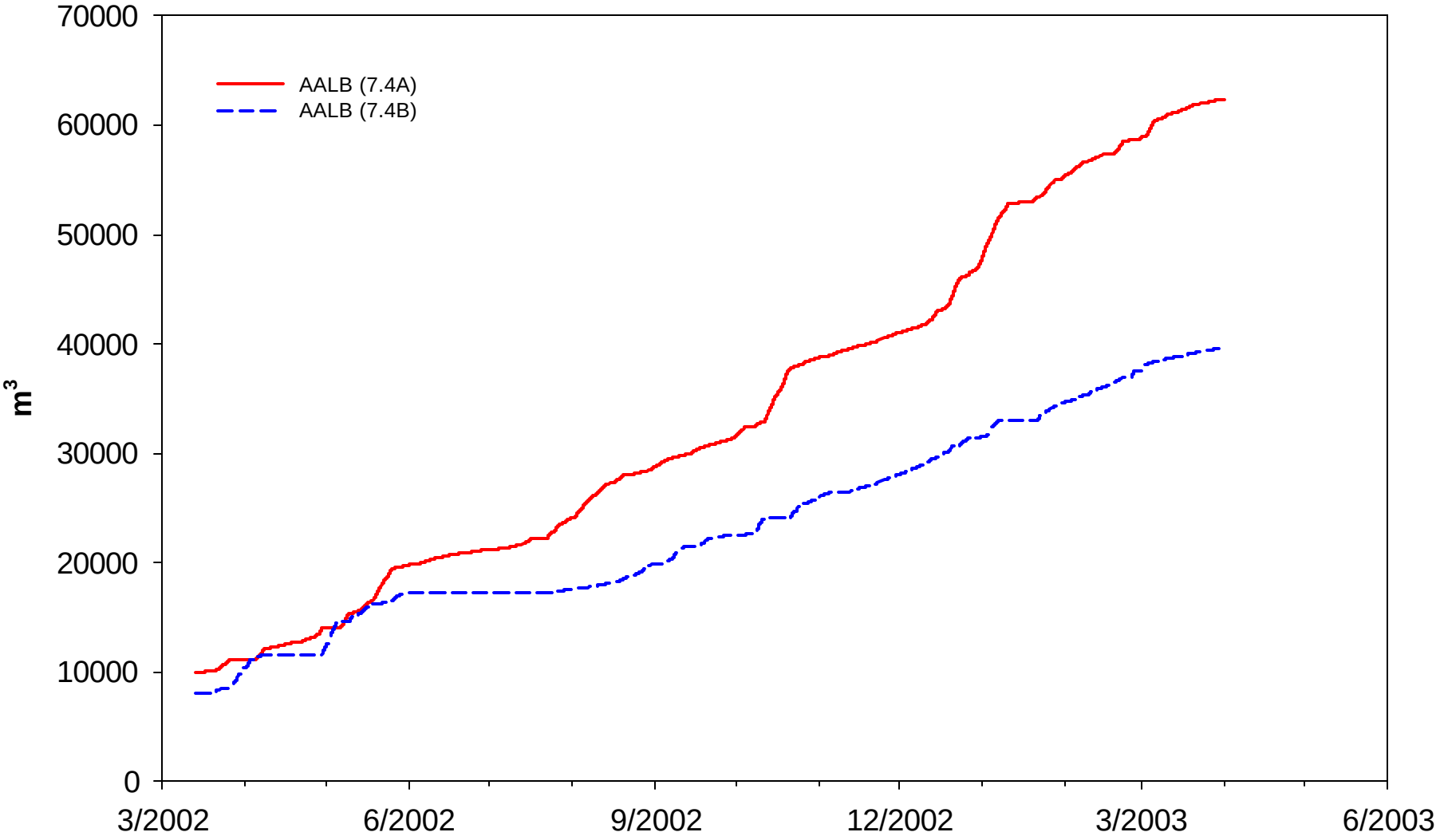


Figure 5-17. Cumulative Leachate Production vs. Time: AALB Cells



Summary of Leachate Temperature

Leachate temperature was measured for each of the study units using a Hanna Instruments Model HI 991301 pH/conductance/temperature probe. Figure 5-18 shows the temperature of leachate from each of these units. The temperature of the FLB and Control units remained relatively consistent over the period monitored, with the variation seen in both Control Cells attributable to seasonal variations. The temperature in both AALB units appear to show a slight upward trend over the period January 2001 through July 2002, before leveling off for the remaining period at a temperature closer to that recorded for the FLB unit versus the Control. Both cells in each unit display similar trends. Basic statistical parameters calculated from the data are provided below In Table 5-2.

TABLE 5-2. SUMMARY OF LEACHATE TEMPERATURE

Cell	*Minimum Temperature*	*Maximum Temperature*	*Mean Temperature*	*Standard Deviation*
FLB 5.1A	23.0	34.6	29.58	3.4048
FLB 5.2B	21.1	31.1	25.82	2.5980
Control 7.3A	9.5	25.3	16.24	4.9550
Control 7.3B	6.8	25.1	16.99	5.2618
AALB 7.4A	19.8	34.7	29.08	4.6699
AALB 7.4B	15.3	33.8	24.96	5.4191

Summary of Leachate pH

Leachate pH readings were collected and analyzed on a monthly basis using field electrodes, results are shown graphically in Figure 5-19. From the graph, the Control and FLB units show relatively constant pH measurements averaging a pH 7 over the June 2001 through April 2003 time period. By comparison, measurements for the AALB study unit did not begin until December 2002 and showed a greater degree of variation, ranging from a pH of below 6 in AALB-B to over 7.5. The AALB pH levels stabilized over the course of the six-month period, with current pH averaging approximately 7. Basic statistical parameters calculated from the data are provided below in Table 5-3.

TABLE 5-3. SUMMARY OF LEACHATE pH

Cell	*Minimum pH Measured*	*Maximum pH Measured*	*Mean pH*	*Standard Deviation*
FLB 5.1A	6.92	7.56	7.22	0.15513
FLB 5.2B	6.84	7.33	7.16	0.13203
Control 7.3A	6.38	7.31	6.83	0.29601
Control 7.3B	6.14	7.20	6.75	0.33671
AALB 7.4A	6.31	7.40	7.07	0.27369
AALB 7.4B	5.89	7.57	6.96	0.50964

Summary of Leachate COD

The COD concentration from the Control units and the AALB units are variable. Concentrations range from under 100 mg/l to approximately 6,000 mg/l, in Control 7.3B, and approximately 1,000 to 30,000 mg/l in the AALB 7.4A. These ranges are comparable with those of the duplicate cells in those units. This variation in the COD concentration corresponds to the addition or presence of newer waste to the landfill units. COD measurements in the FLB study unit remain more constant, with the exception of a sharp dip in COD concentrations recorded for FLB 5.2 in March 2002. COD measurements following the March 2002 reading in FLB 5.2 stabilize and average approximately 1000 mg/l for the remaining period of measurement, as represented graphically in Figure 5-20. Basic statistical parameters calculated from the data are provided below in Table 5-4.

TABLE 5-4. SUMMARY OF LEACHATE COD

Cell	*Minimum COD Measured*	*Maximum COD Measured*	*Mean COD*	*Standard Deviation*
FLB 5.1A	882.0	2620	1848.0	449.1
FLB 5.2B	114.0	3560	1366.0	640.7
Control 7.3A	114.0	3170	667.2	721.0
Control 7.3B	60.3	5720	963.8	1297.2
AALB 7.4A	916.0	30900	5282.0	7488.5
AALB 7.4B	1840.0	26000	7222.0	7039.3

Summary of Leachate BOD

Sampling for BOD began in June 2001 for both the Control and FLB units. Sampling for BOD in the AALB began in December 2001. Results of the BOD analysis are shown graphically in Figure 5-21. Basic statistical parameters calculated from the data are also provided below in Table 5-5.

BOD levels showed considerable variation early in the sampling process in the Control and AALB units. Levels in the Control showed values ranging from below 50 mg/l to greater than 5,000 mg/l in the first 13 months of sampling. The AALB indicated similar values, but has continued to show varied readings through the most recently reported sampling events. BOD results for the FLB show less varied results with values ranging from approximately 100 mg/l to 1,000 mg/l.

TABLE 5-5. SUMMARY OF LEACHATE BOD

Cell	*Minimum BOD Measured*	*Maximum BOD Measured*	*Mean BOD*	*Standard Deviation*
FLB 5.1A	32.9	1060	189.0	228.7
FLB 5.2B	24.9	783	156.0	185.7
Control 7.3A	14.6	1820	155.6	395.4
Control 7.3B	9.2	31400	1784.0	6805.0
AALB 7.4A	20.0	15000	1967.0	3427.1
AALB 7.4B	142.0	54400	6233.0	12546.6

Figure 5-18. Leachate Temperature vs. Time

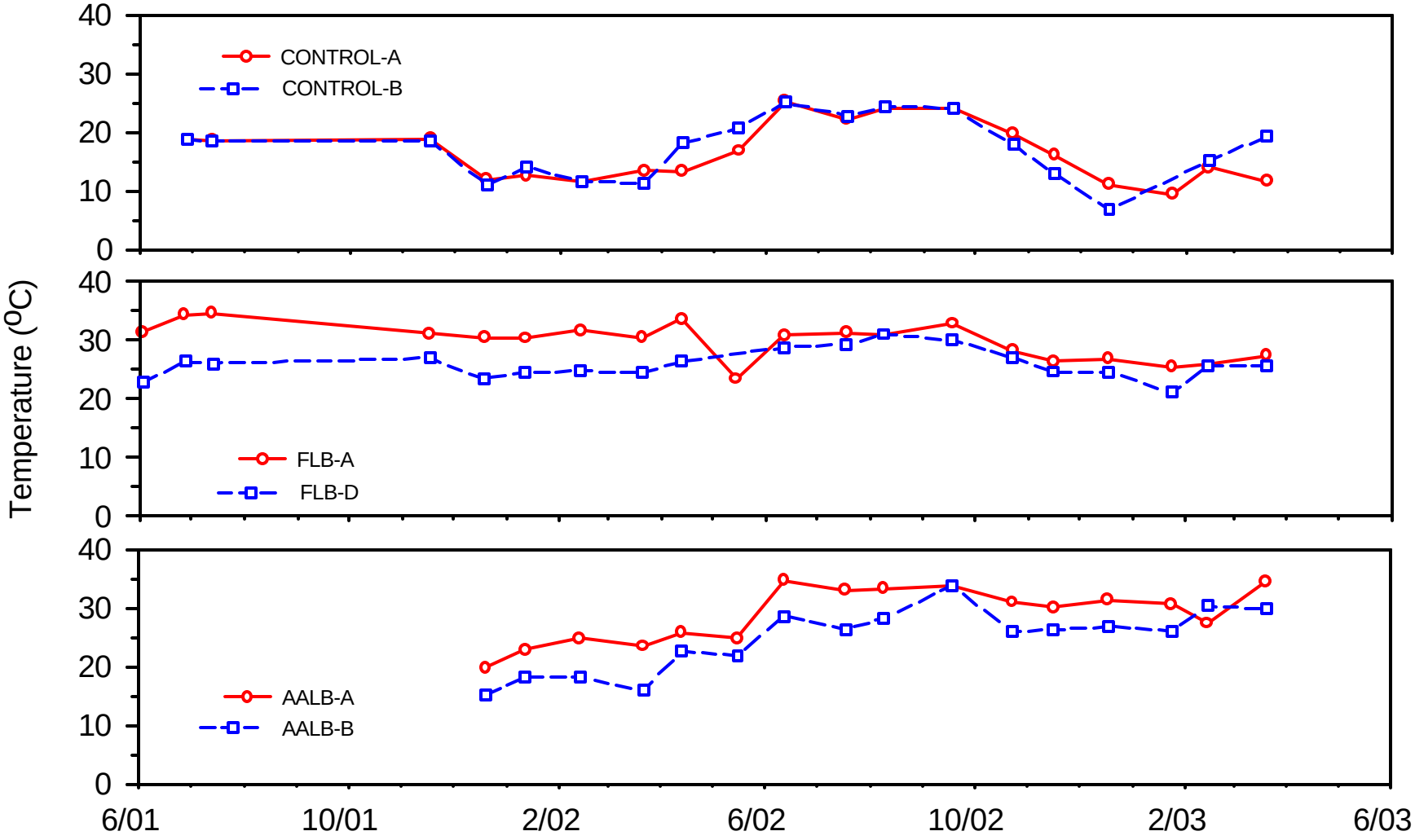


Figure 5-19. Leachate pH vs. Time

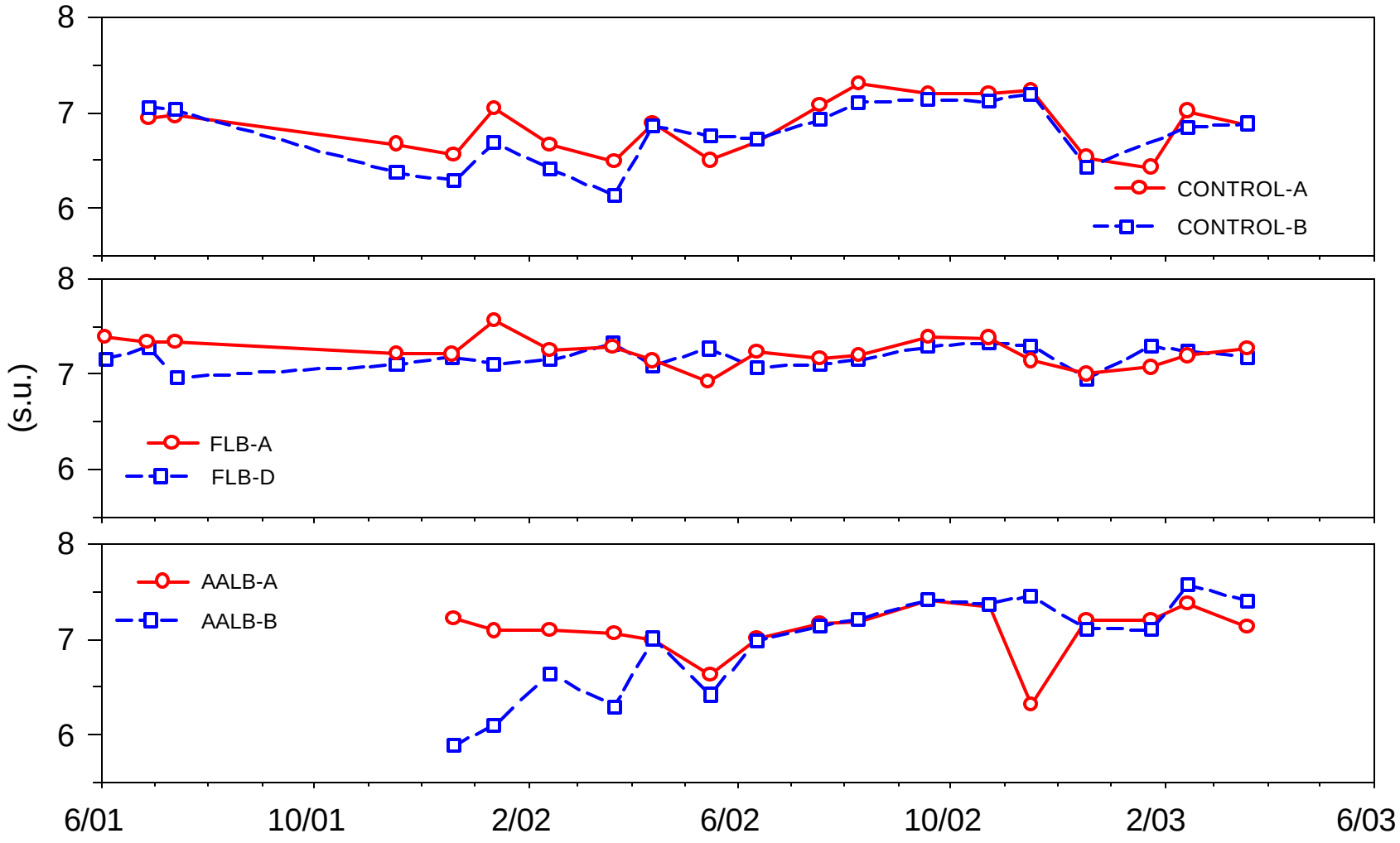


Figure 5-20. Leachate COD vs. Time

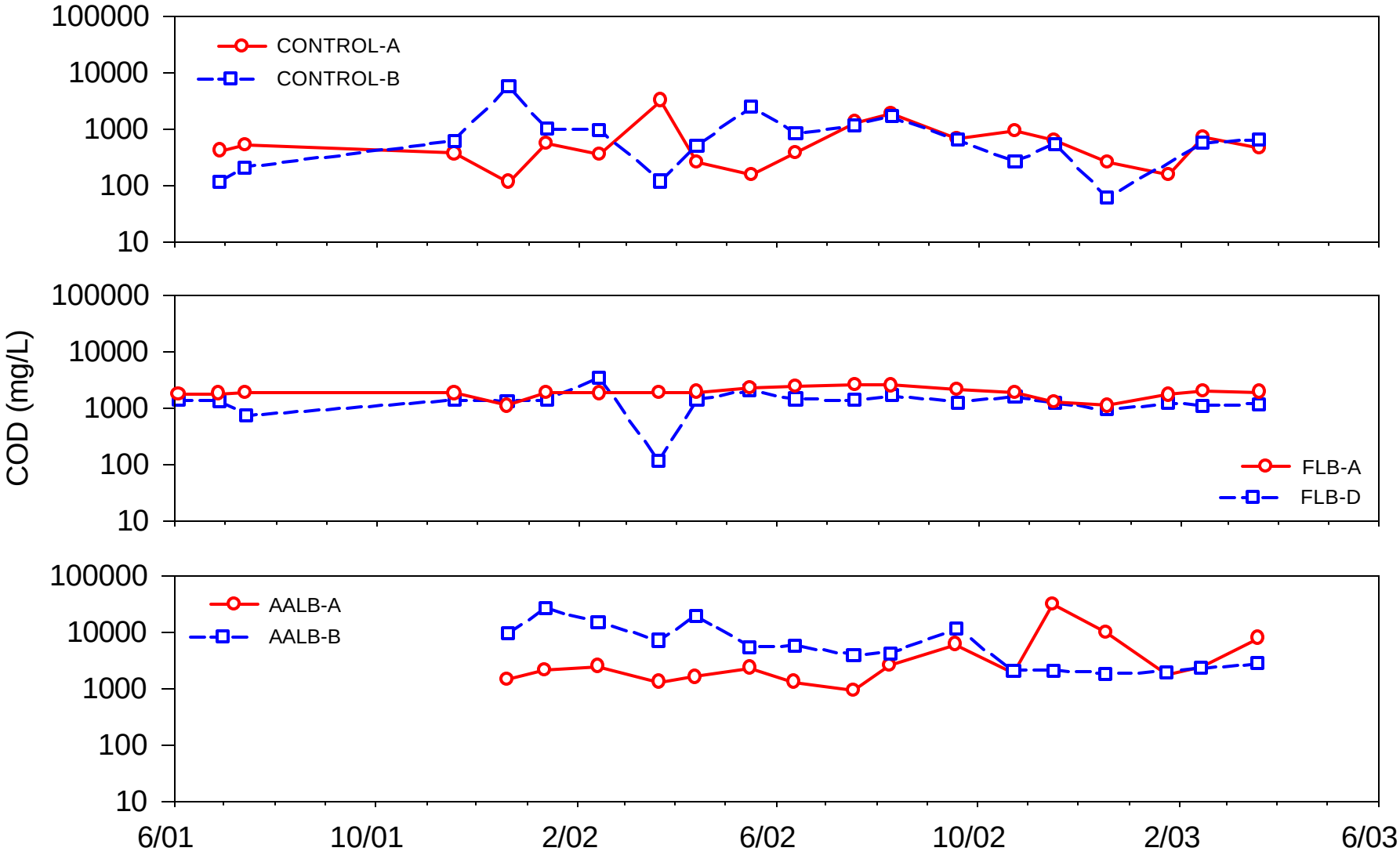
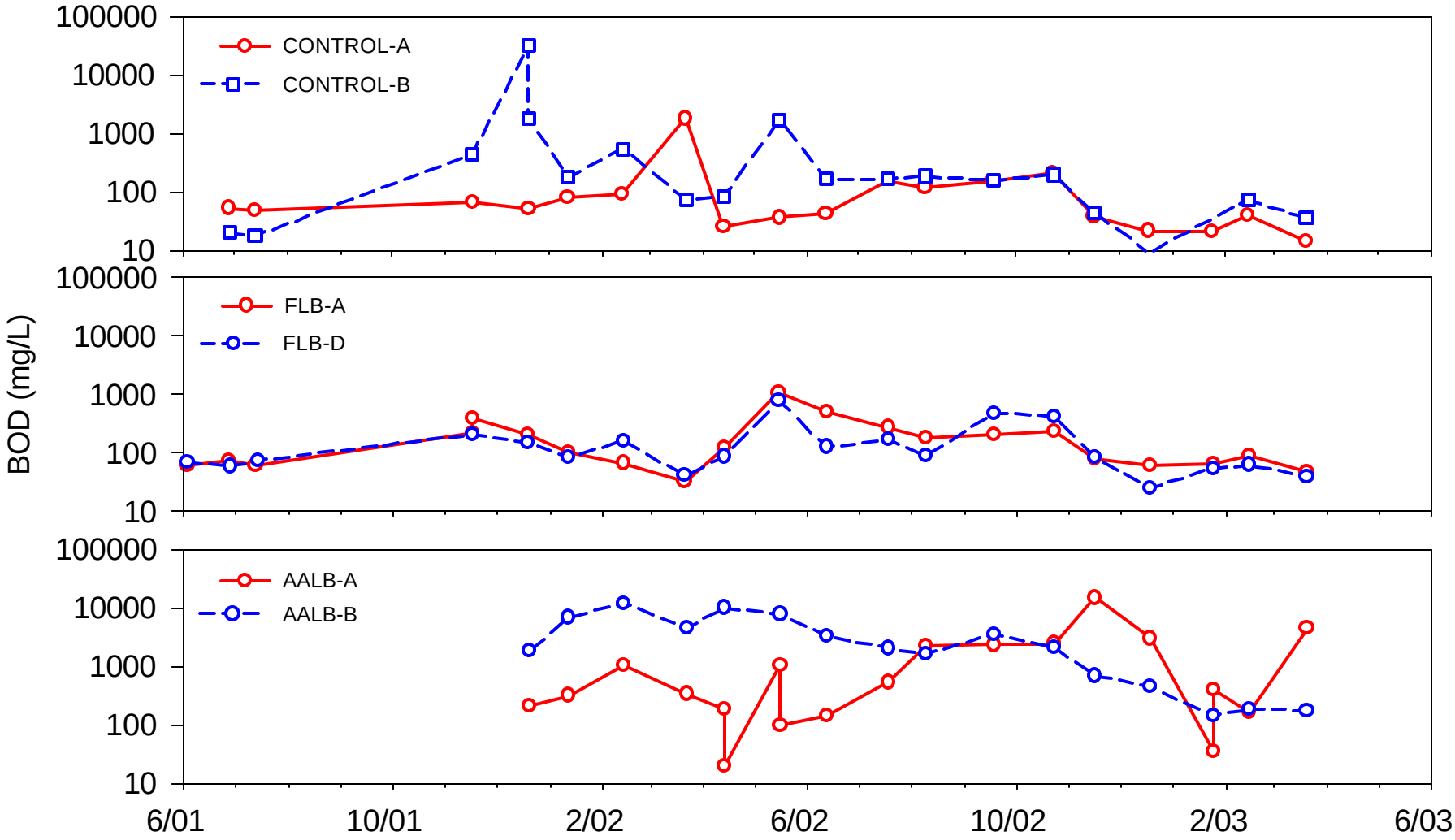


Figure 5-21. Leachate BOD vs. Time



Summary of Leachate Conductance

The leachate conductance for each of the three study units is shown graphically in Figure 5-22. Conductance was measured on a monthly basis using a field electrode.

Conductance levels in the FLB and AALB were considerably higher than those levels found in the Control unit. Results in the FLB ranged from approximately 9,000 umhos/cm to 15,000 umhos/cm. Results for the AALB showed readings that varied between 6,000 umhos/cm to nearly 17,000 umhos/cm. Levels for the Control unit indicated relatively stable reading that averaged 3,000 umhos/cm, with a spike in the September 2002 sampling of 12,000 umhos/cm, levels returned to the 3,000 umhos/cm range following this sampling event.

Summary of Leachate Ammonia-Nitrogen (NH_3-N) Levels

Ammonia Nitrogen Levels in leachate were analyzed in samples taken on a monthly basis. Results of Ammonia Nitrogen levels in leachate are shown graphically in Figure 5-23. Basic statistical parameters calculated from the data are provided below in Table 5-6.

Sampling began in June 2001 for the Control and FLB units and in December 2001 for the AALB unit. Samples for all three of the study units show relatively consistent results averaging approximately 500 mg/l in the Control and AALB units. The FLB unit showed a higher average of approximately 1000 mg/l.

TABLE 5-6. SUMMARY OF LEACHATE AMMONIA-NITROGEN LEVELS

Cell	*Min [NH_4-N] Measured*	*Max [NH_4-N] Measured*	*Mean [NH_4-N]*	*Standard Deviation*
FLB 5.1A	551	19200	2445	4410
FLB 5.2B	432	7010	1291	1393
Control 7.3A	67	1420	460	432
Control 7.3B	49	1410	376	406
AALB 7.4A	162	2720	922	653
AALB 7.4B	97	1540	921	463

Summary of Leachate Nitrate-Nitrogen (NO_3-N) Levels

Nitrate-Nitrogen levels (NO_3-N) were analyzed from samples taken on a monthly basis in the laboratory using EPA Method 353.2. Sample results for the three study units are displayed in Figure 5-24. Basic statistical parameters calculated from the data are provided below in Table 5-7.

Both the Control and FLB units showed a relatively stable nitrate level over the period 6/01 through 4/03, typically in the 0.01 to 0.1mg/L range. The AALB unit showed greater variability over the period of measurement, 12/01 through 4/03, in both A and B cells. AALB A showed concentrations typically in the same, to one order of magnitude higher, range as the Control and FLB units. AALB B, however, showed overall higher nitrate levels, typically one order of magnitude but reaching levels of >10mg/L.

TABLE 5-7. SUMMARY OF LEACHATE NITRATE-NITROGEN

Cell	*Min [NO_3-N] Measured*	*Max [NO_3-N] Measured*	*Mean [NO_3-N]*	*Standard Deviation*
FLB 5.1A	0.02	0.13	0.06	0.04
FLB 5.2B	0.02	0.20	0.04	0.05
Control 7.3A	0.02	0.20	0.05	0.06
Control 7.3B	0.02	0.26	0.05	0.06
AALB 7.4A	0.02	1.70	0.22	0.40
AALB 7.4B	0.02	26.50	2.31	6.38

Summary of Leachate Nitrite-Nitrogen (NO_2-N) Levels

Leachate nitrite-nitrogen (NO_2-N) measurements are taken on a monthly basis for all three of the study units, plots showing the concentrations vs. time are shown in Figure 5-25. Sample collection started in 6/01 for the FLB and Control units, and 12/01 for the AALB unit. Basic statistical parameters calculated from the data are provided below in Table 5-8.

Trends for nitrite-nitrogen have remained relatively steady for the FLB and Control units with measurements averaging in both cases approximately 0.1mg/L (typical range 0.05 – 0.5mg/L). The measurements for the AALB A cell were comparable with the Control and FLB. AALB B showed greater fluctuation with measurements varying between 0.1 to 10mg/l in the first eight to nine months of measurement. AALB B nitrite levels showed indications of stabilization around August 2002, with readings averaging 0.1 mg/l.

TABLE 5-8. SUMMARY OF NITRITE-NITROGEN

Cell	*Min [NO_2-N] Measured*	*Max [NO_2-N] Measured*	*Mean [NO_2-N]*	*Standard Deviation*
FLB 5.1A	0.02	0.28	0.08	0.07
FLB 5.2B	0.02	0.24	0.06	0.06
Control 7.3A	0.02	0.28	0.06	0.07
Control 7.3B	0.02	2.00	0.19	0.45
AALB 7.4A	0.05	0.65	0.24	0.18
AALB 7.4B	0.09	10.70	1.30	2.78

Figure 5-22. Leachate Conductance vs. Time

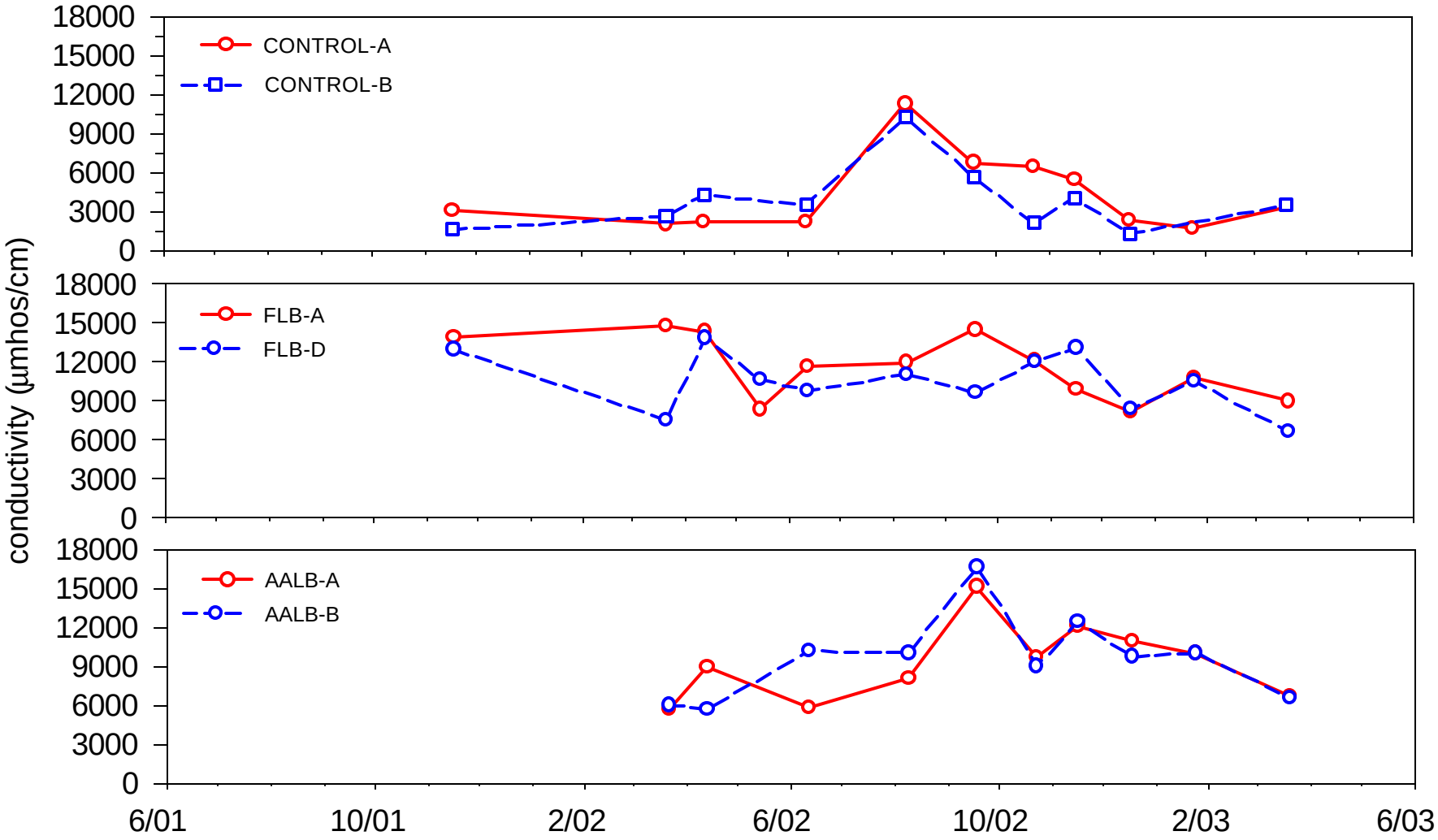


Figure 5-23. Leachate NH_3-N vs. Time

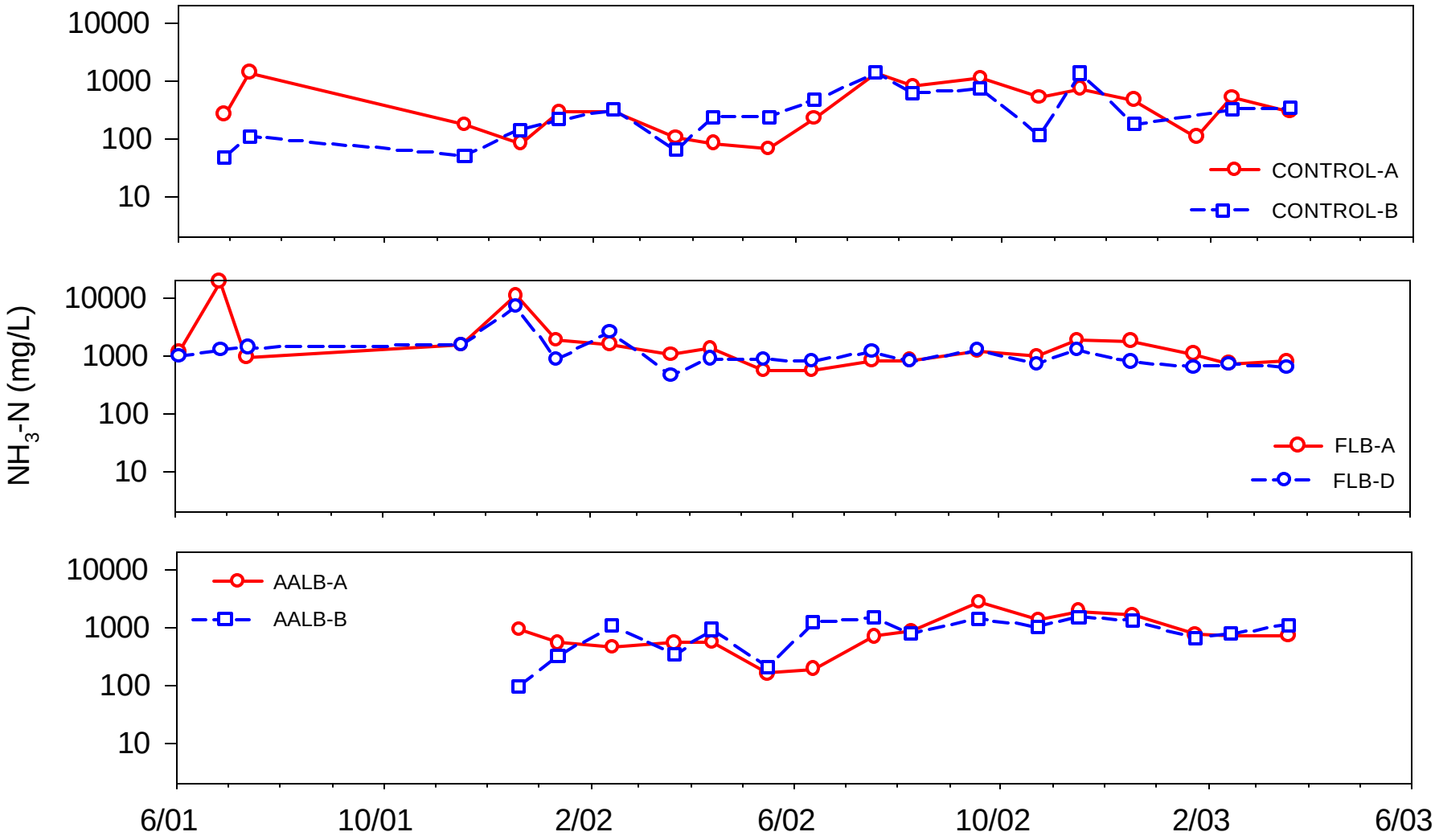


Figure 5-24. Leachate NO_3-N vs. Time

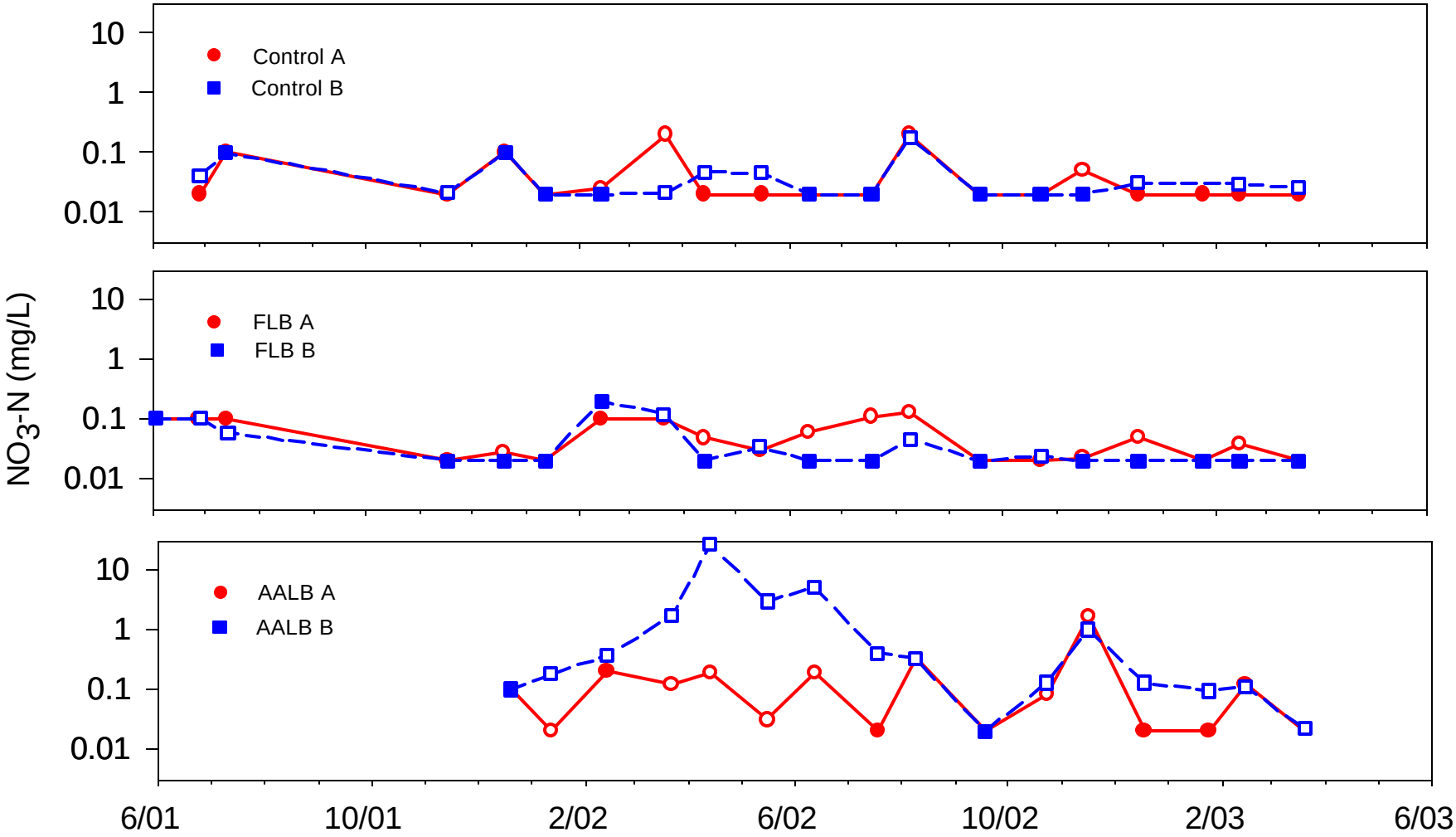
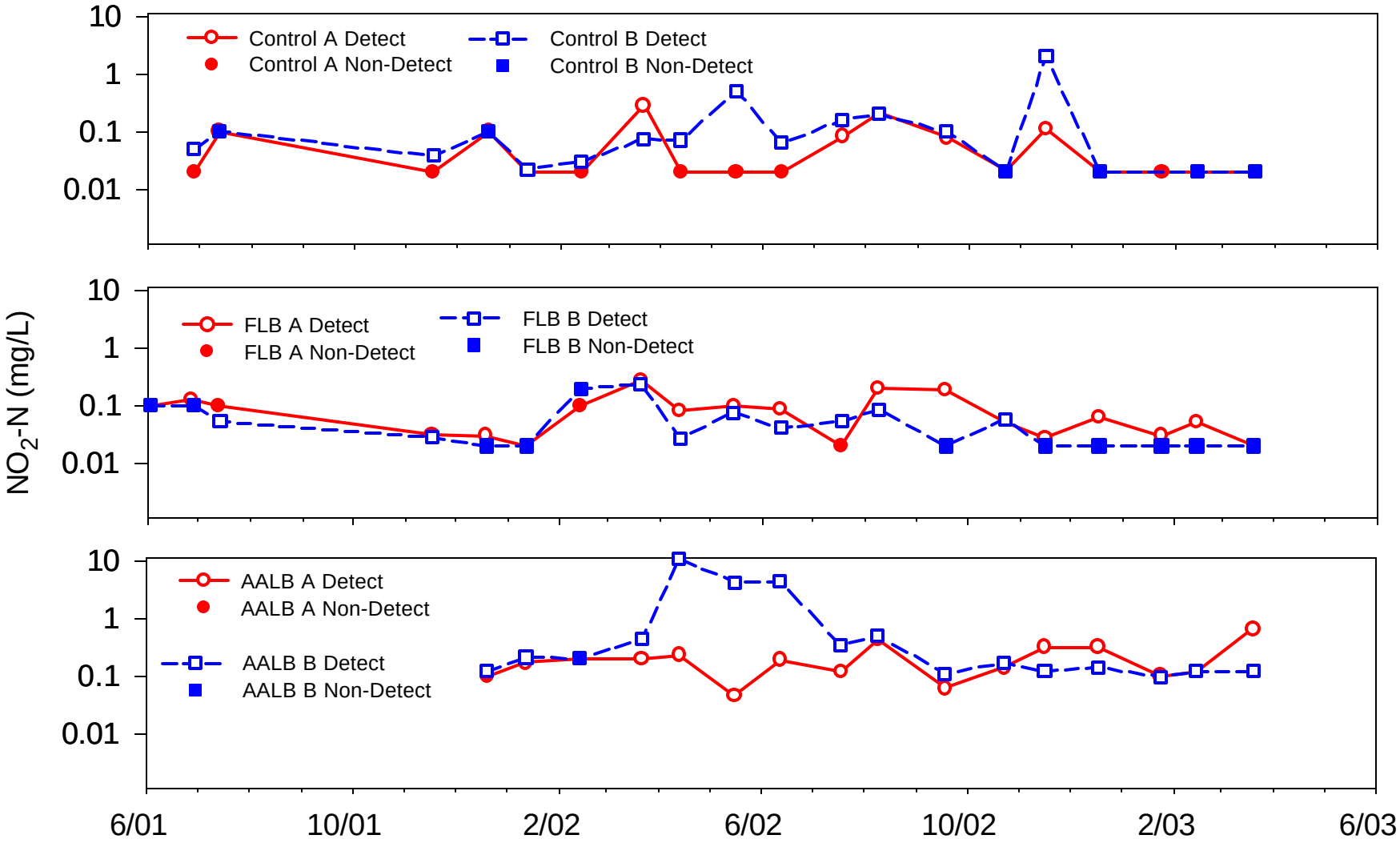


Figure 5-25. Leachate NO_2-N vs. Time



Summary of Leachate o-Phosphate

Leachate o-phosphate measurements were taken on a monthly basis and are displayed graphically in Figure 5-26. Basic statistical parameters calculated from the data are also provided below in Table 5-9. Measurements for total o-Phosphate commenced for the FLB and Control units in June 2001, with AALB measurements beginning in December 2001.

Measurements for the Control and FLB remain relatively stable with results averaging 1 to 3 mg/l. An increase in level to 7 mg/l for FLB 5.2B was recorded in February 2002. A similar increase in the Control unit was recorded in August 2002. o-Phosphate levels in the AALB unit indicate levels ranging between 1 mg/l to 15 mg/l.

TABLE 5-9. SUMMARY OF LEACHATE o-PHOSPHATE

Cell	*Minimum [o-Phosphate]*	*Maximum [o-Phosphate]*	*Mean [o-Phosphate]*	*Standard Deviation*
FLB 5.1A	1.6	4.6	2.9	0.8
FLB 5.2B	0.5	6.8	2.0	1.3
Control 7.3A	0.1	3.4	1.1	0.8
Control 7.3B	0.3	4.8	1.1	1.0
AALB 7.4A	0.8	15.4	3.4	3.5
AALB 7.4B	1.2	8.2	3.7	2.0

Summary of Leachate Total Phosphorus

Total phosphorous in leachate was measured for the three study units beginning in June 2001 for the Control and FLB, and in December 2001 for the AALB. Total phosphorous measurements are shown graphically in Figure 5-27. Basic statistical parameters calculated from the data are also provided below in Table 5-10.

Total phosphorous results show stable readings for both the Control and FLB units. Readings averaged approximately 2 to 3 mg/l for both of these units. The AALB results fluctuated more in comparison with the Control and FLB units, with measurements from near 0 mg/l to 10 mg/l, with the highest results recorded from July 2002 to August 2002.

TABLE 5-10. SUMMARY OF LEACHATE TOTAL PHOSPHOROUS

Cell	*Minimum [Total P]*	*Maximum [Total P]*	*Mean [Total P]*	*Standard Deviation*
FLB 5.1A	0.77	5.3	2.9	1.2
FLB 5.2B	1.00	14.2	3.3	2.9
Control 7.3A	0.11	5.3	1.5	1.3
Control 7.3B	0.11	5.6	1.8	1.5
AALB 7.4A	0.92	21.6	5.4	5.1
AALB 7.4B	0.33	10.5	3.8	3.2

Summary of Leachate Total Kjeldahl Nitrogen (TKN)

Total TKN in leachate is taken on a quarterly basis for each of the study units. A summary of the total TKN in leachate vs. time are shown in Figure 5-28. Measurements for Total TKN in the Control and FLB study units began in June 2001. From the Figure, total TKN in the Control unit maintains relatively stable measurements with time, averaging approximately 200 mg/l in unit A and 100 mg/l in unit B. Measurements for total TKN in the FLB study cells show a greater degree of variation than displayed in the control unit, with cells 5.1A and 5.2B ranging in concentrations from approximately 75 mg/l to 1100 mg/l. Sampling for the total TKN in the AALB study units began in March 2002, and showed concentrations varying between near 0 mg/l to over 700 mg/l. Basic statistical parameters calculated from the data are also provided below in Table 5-11.

TABLE 5-11. SUMMARY OF LEACHATE TKN

Cell	*Minimum [TKN]*	*Maximum [TKN]*	*Mean [TKN]*	*Standard Deviation*
FLB 5.1A	189	1160	812.7	348.8
FLB 5.2B	89.2	1040	585.2	365.6
Control 7.3A	91.9	371	194.1	94.1
Control 7.3B	12.6	390	94.7	123.1
AALB 7.4A	26.5	434	246.7	174.9
AALB 7.4B	100	721	298.6	251.0

Summary of Leachate Total Dissolved Solids

Results are shown graphically in Figure 5-29. Sampling for the Control and FLB units began in June 2002 and sampling for total dissolved solids for the AALB began in March 2002.

Results for the Control unit show consistent readings for total dissolved solids averaging 2,500 mg/l through the sampling event in April 2003. Results for the FLB indicate stable readings averaging 5,500 mg/l. An increase to 25,000 mg/l indicated for the January 2003 sample for FLB 5.1, results returned to 5,500 mg/l for the February 2003. Sample results for the AALB unit range between 5,000 mg/l to 10,000 mg/l.

Figure 5-26. Leachate o-Phosphate vs. Time

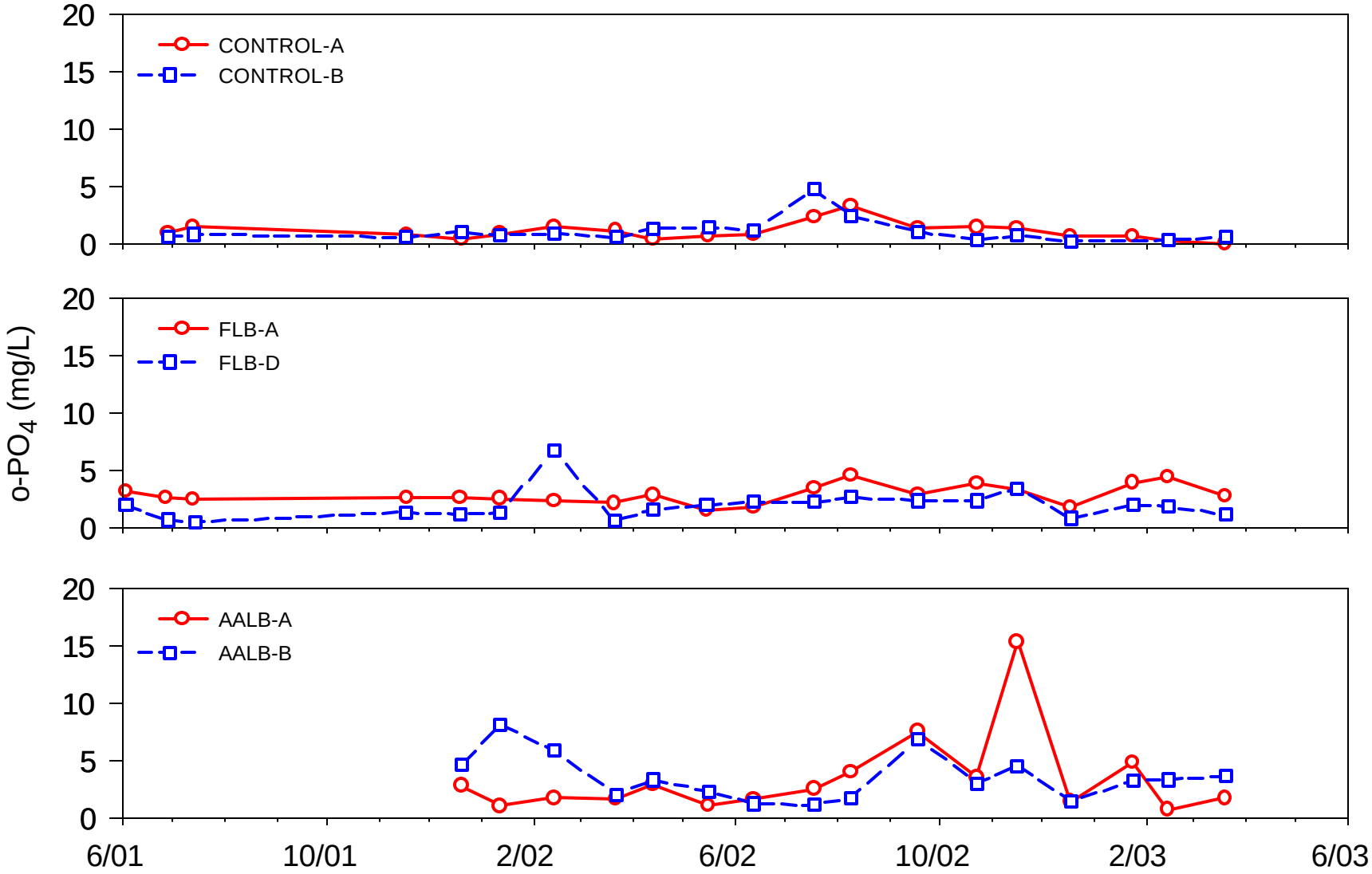


Figure 5-27. Leachate Total Phosphorus vs. Time

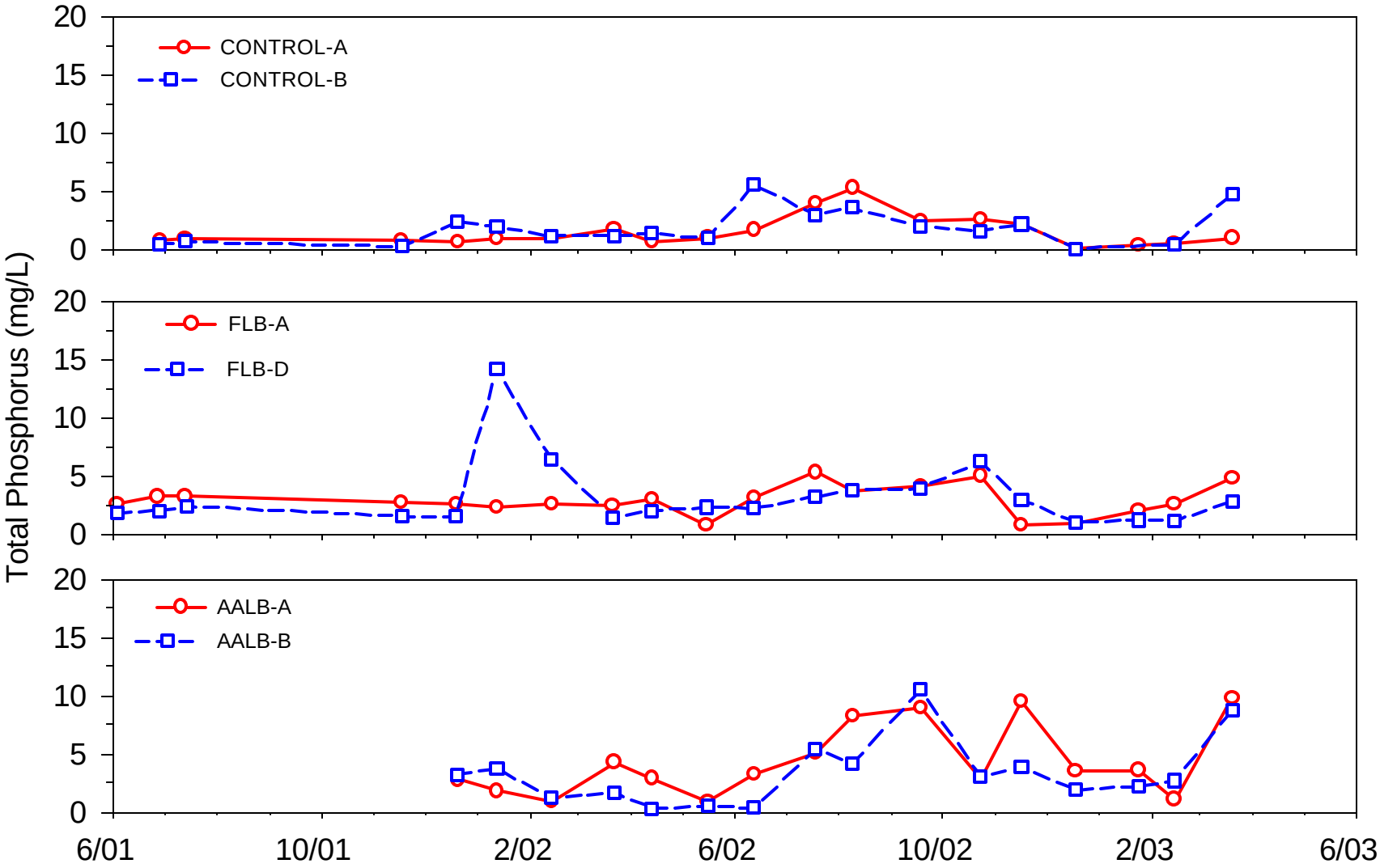


Figure 5-28. Leachate TKN vs. Time

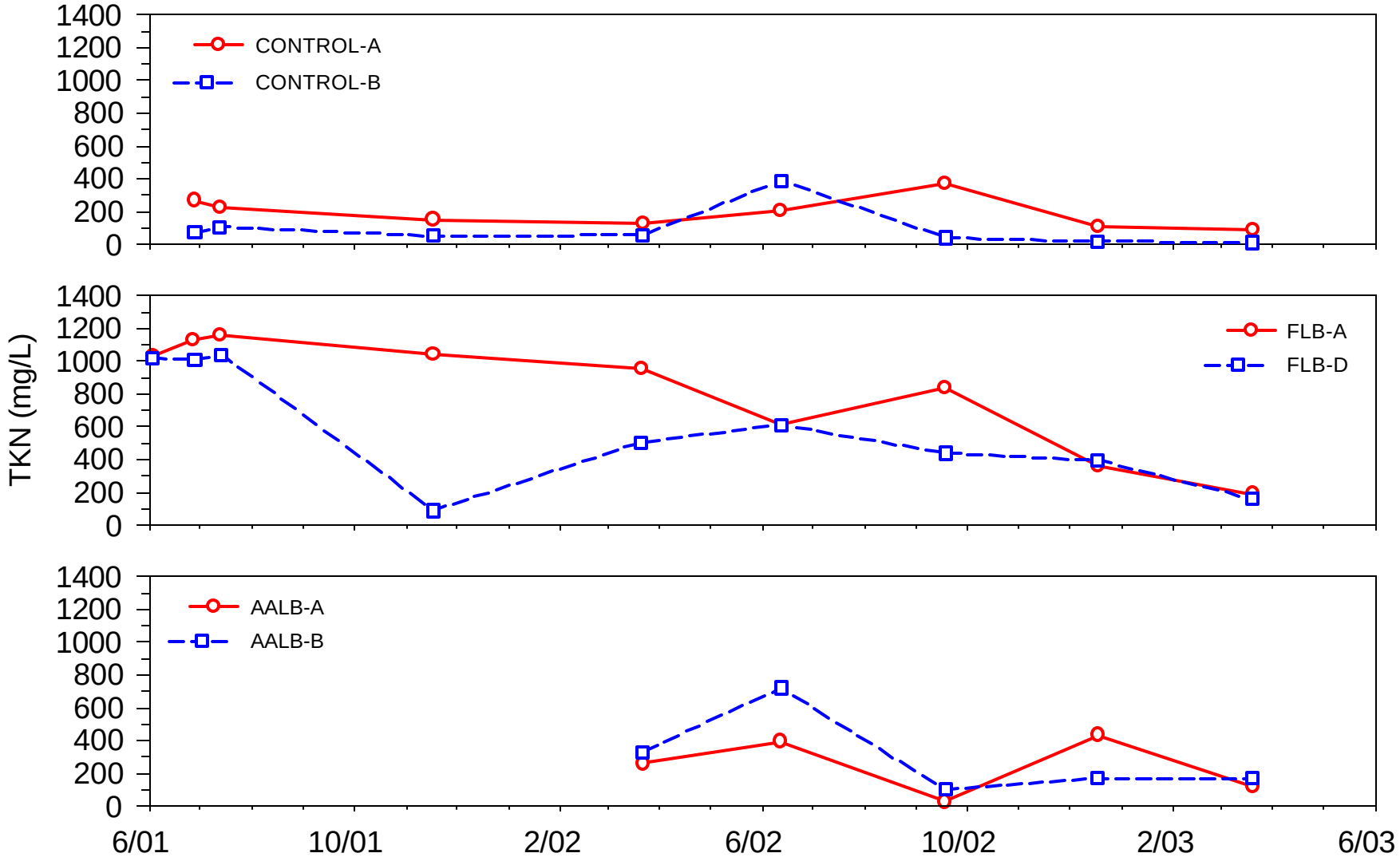
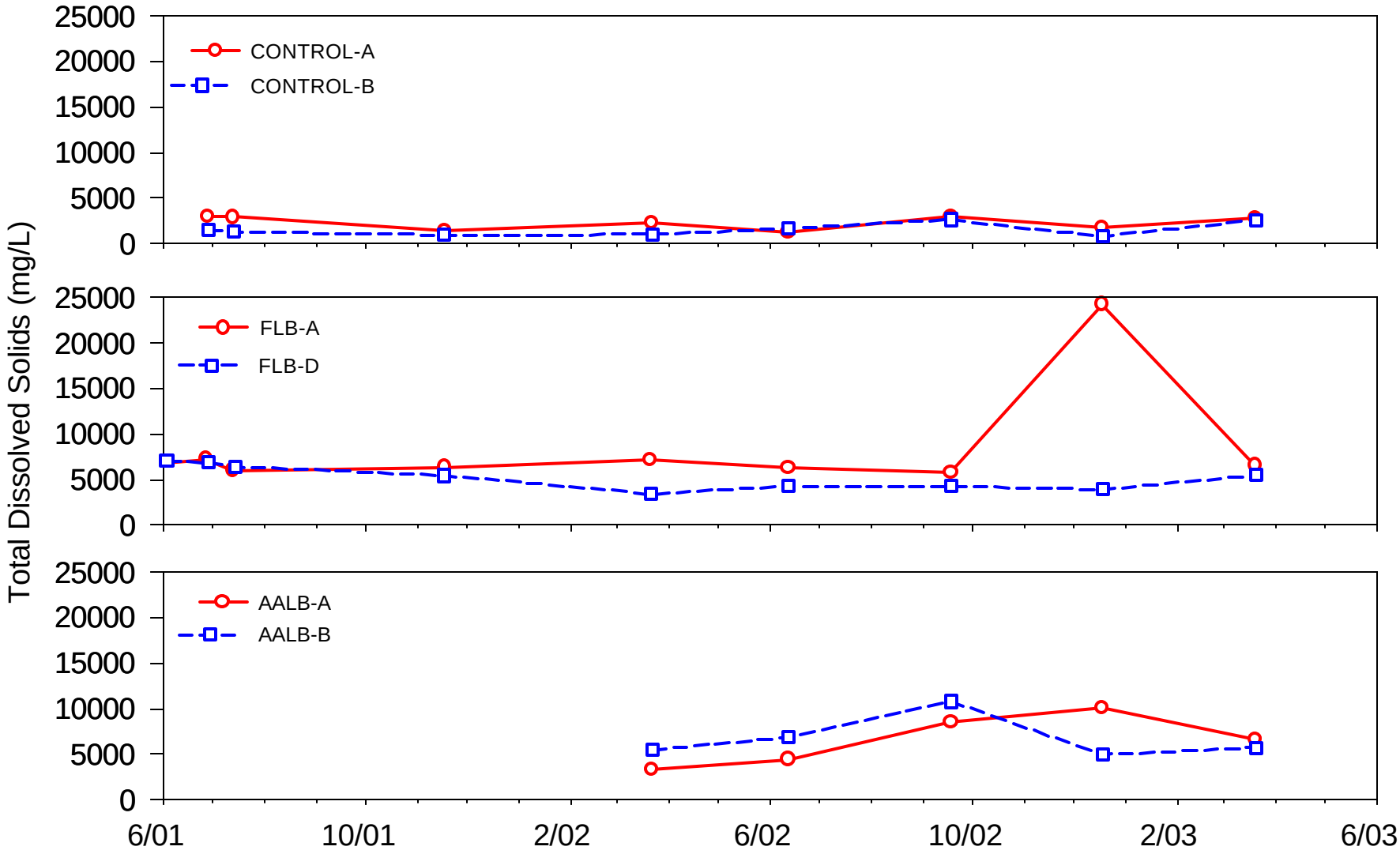


Figure 5-29. Leachate Total Dissolved Solids vs. Time



Summary of Leachate Sulfate

Sulfate was measured in leachate beginning in June 2001 for both the Control and FLB, and beginning in March 2002 for the AALB. The results for concentrations of sulfate in leachate are shown graphically in Figure 5-30.

Sulfate was detected in all three of the study units, but at low concentrations. Sulfate levels in the Control indicate consistent measurements with readings averaging <100 mg/l. Sulfate levels for the control steadily increase with measurements averaging approximately 200 mg/l by March 2003. A sharp spike of 900 mg/l was noted for the March 2003 sampling event.

Sulfate in the FLB remains consistent with readings averaging <100 mg/l. An increase to approximately 200 mg/l was recorded in March 2002, but returned to previous levels the following sampling event. Sulfate measurements in leachate for the AALB indicated similar values to measurements recorded for the FLB, with results averaging <100 mg/l.

Summary of Leachate Chloride

Chloride was measured in leachate beginning in June 2001 for both the Control and FLB units, and beginning in March 2002 for the AALB. Results of the Chloride in leachate are displayed graphically in Figure 5-31.

Chloride was detected in the leachate samples for the Control units within a range of close to 0 mg/l up to approximately 750 mg/l, with results remaining consistent. Samples for the FLB show chloride typically ranging in concentration from approximately 1000mg/l to 2,300 mg/l, with one atypical value at close to 0 mg/l. Chloride levels in the FLB unit were consistently higher than those of the Control. Samples for the AALB show good consistency between the AALB 7.4A and AALB 7.4B units, with concentrations ranging between approximately 500 mg/l to 1,250 mg/l. Results are summarized below in Table 5-12.

TABLE 5-12. SUMMARY OF LEACHATE CHLORIDE

Cell	*Minimum [Chloride]*	*Maximum [Chloride]*	*Mean [Chloride]*	*Standard Deviation*
FLB 5.1A	1.0	2350	163.0	552.31
FLB 5.2B	1.0	2340	150.1	548.46
Control 7.3A	1.0	389	24.1	91.14
Control 7.3B	1.0	1010	109.3	263.81
AALB 7.4A	1.0	1650	484.2	554.73
AALB 7.4B	2.9	2580	582.1	845.87

Summary of Leachate Total Potassium

Total potassium in leachate was measured for the three study units beginning in June 2001 for the Control and FLB units, and in March 2002 for the AALB unit. Figure 5-32 shows results for the three study units.

Total potassium measurements for the Control sample indicate relatively consistent results with readings averaging 100 mg/l. The FLB unit indicates more varied results with results ranging from 400 mg/l to nearly 1,000 mg/l. The AALB unit indicates more consistent readings with results averaging 500 mg/l.

Summary of Leachate Volatile Organic Acids

Samples of volatile organic acids (VOAs) in leachate are collected on a monthly basis. Samples are collected for acetic, butyric, formic, and lactic acids. Sample results are shown graphically for each representative acid and can be found in Figures 5-33 through 5-38. Samples were collected for the three study units beginning November 2001 for the Control and FLB, and in December 2001 for the AALB.

Acetic Acid --

Acetic acid in leachate was typically detected in the Control and FLB at levels near 0 mg/l. The Control unit showed the odd spike early in the sampling program up to approximately 1,000 mg/l. The FLB showed spikes of up to approximately 2,500 mg/l. Acetic acid levels in both the Control and FLB returned to near 0 mg/l following the elevated readings.

Acetic acid in leachate in the AALB unit shows much more varied readings over the same period from near 0 mg/l up to near 2,500 mg/l. These varied results continue throughout the period to date. Basic statistical parameters calculated from the data are also provided below.

Butyric Acid --

Butyric acid in leachate was detected in the Control and FLB units at levels near 0 mg/l. The Control and FLB results indicate relatively stable measurements with occasional peaks that range between 0 mg/l and 2,000 mg/l. In the cases of the elevated readings, levels returned to near 0 mg/l in the subsequent sampling events.

Levels of butyric acid in the AALB showed varied results in comparison to the Control and FLB units. Measurements indicate ranges between 0 mg/l and to 1,000 mg/l.

Figure 5-30. Leachate Sulfate vs. Time

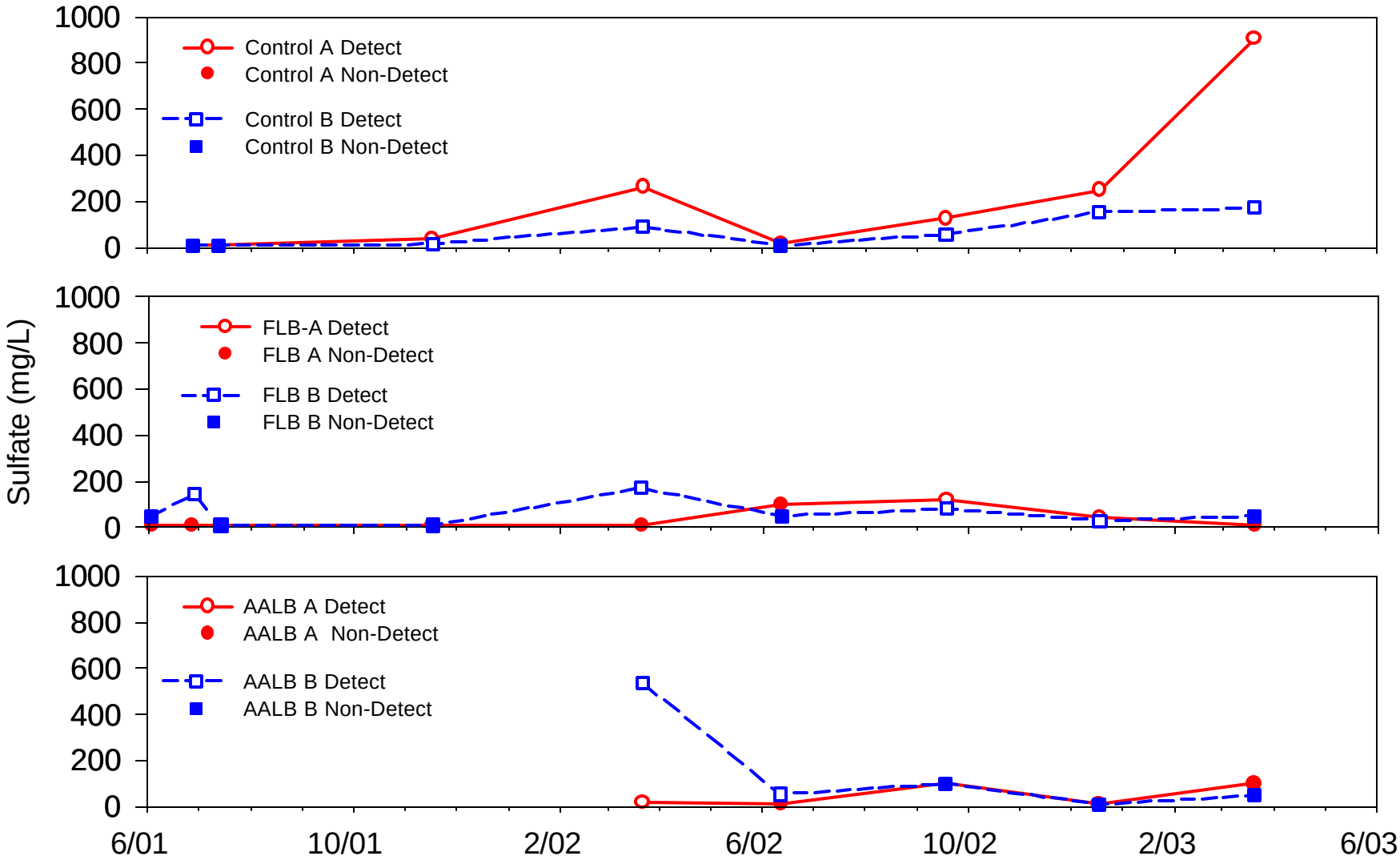


Figure 5-31. Leachate Chloride vs. Time

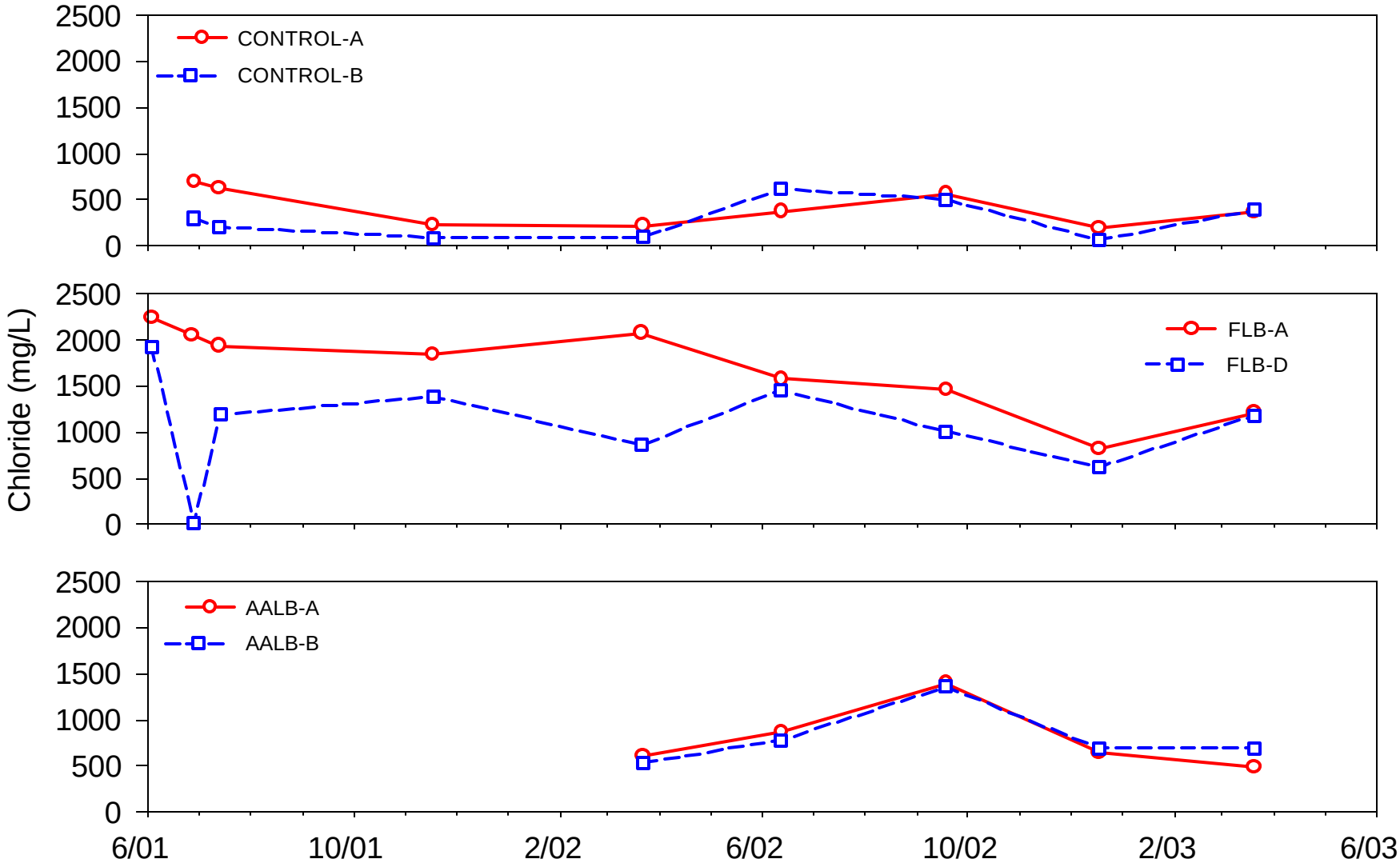
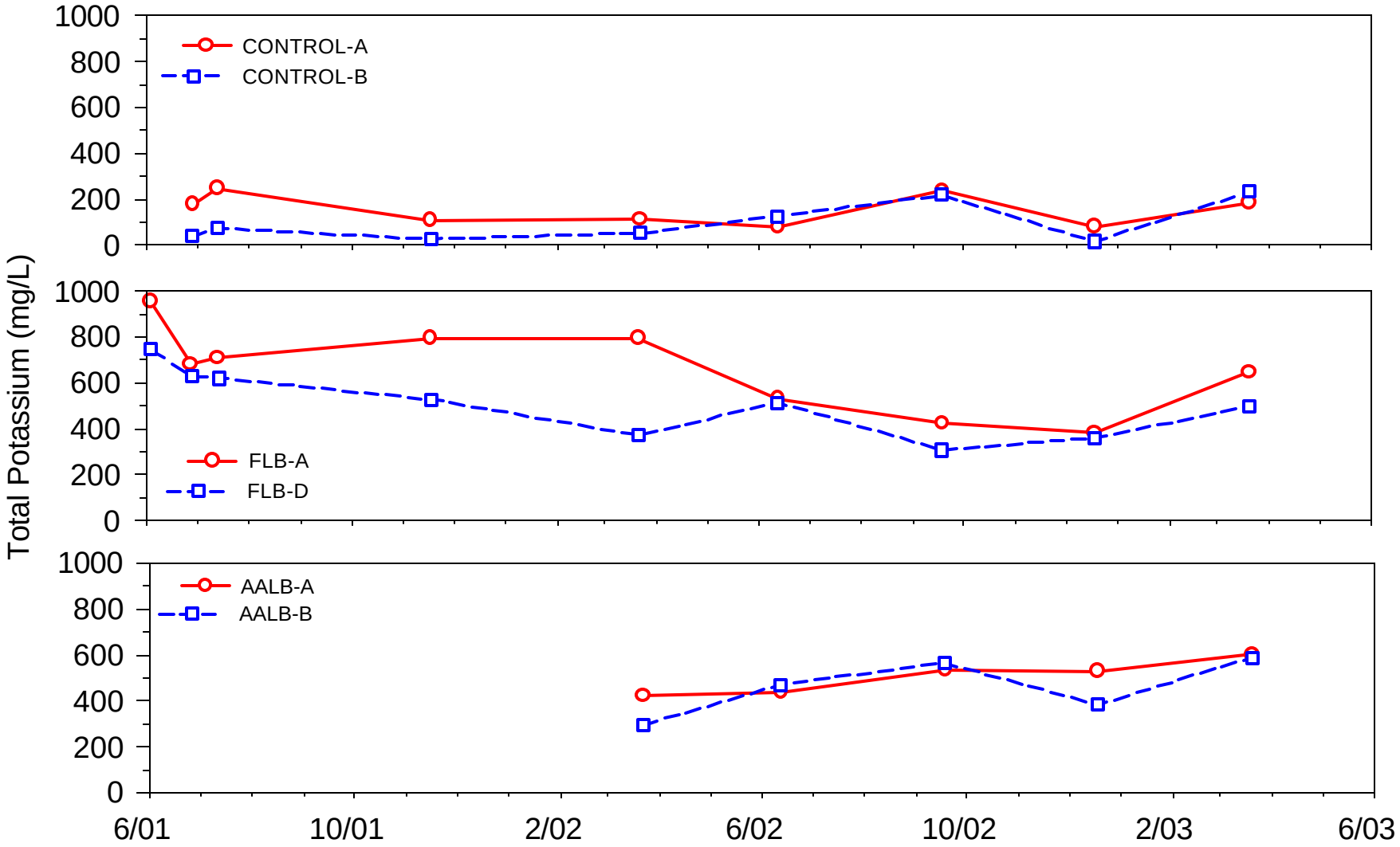


Figure 5-32. Leachate Total Potassium vs. Time



Formic Acid --

Formic acid in leachate was detected in the three study units, with sampling beginning in December 2001. Figure 5-35 shows the graphical results of formic acid levels in leachate for the three study units.

Levels of formic acid for all three of the study units showed varying results ranging from near 0 mg/l to nearly 25 mg/l. Results for the Control and FLB units showed stabilization near 0 mg/l beginning in the August 2002 sampling event, while the AALB began stabilizing to near 0 mg/l in the February 2003 sampling period.

Lactic Acid --

Results for lactic acid in leachate samples are shown graphically in Figure 5-36. Sampling for lactic acid began in November 2002 for the Control and FLB units, and in December 2002 for the AALB unit. Results indicate non-detects for a majority of the sampling events.

Propionic Acid --

Propionic acid samples were collected in the three study units beginning in November 2001 for the Control and FLB units, and in December 2001 for the AALB. Sample results are shown graphically in Figure 5-37.

Levels of propionic acid in the Control and FLB units were relatively stable with results averaging 0 mg/l. The FLB unit showed two spikes in the results with values near 3,000 mg/l in April and November 2002, levels returned to near 0 mg/l in the following sampling event. The AALB unit showed more varied results with reading ranging from 0 mg/l to 2000 mg/l.

Pyruvic Acid --

Pyruvic acid samples were collected for all three units of study beginning in December 2002. Results are shown graphically in Figure 5-38.

Pyruvic acid levels show varied results in the all three of the study units. Results for the three units' range in concentration from near 0mg/l to 175 mg/l in the FLB. Similar results were found for the Control and AALB.

Figure 5-33. Leachate Acetic Acid vs. Time

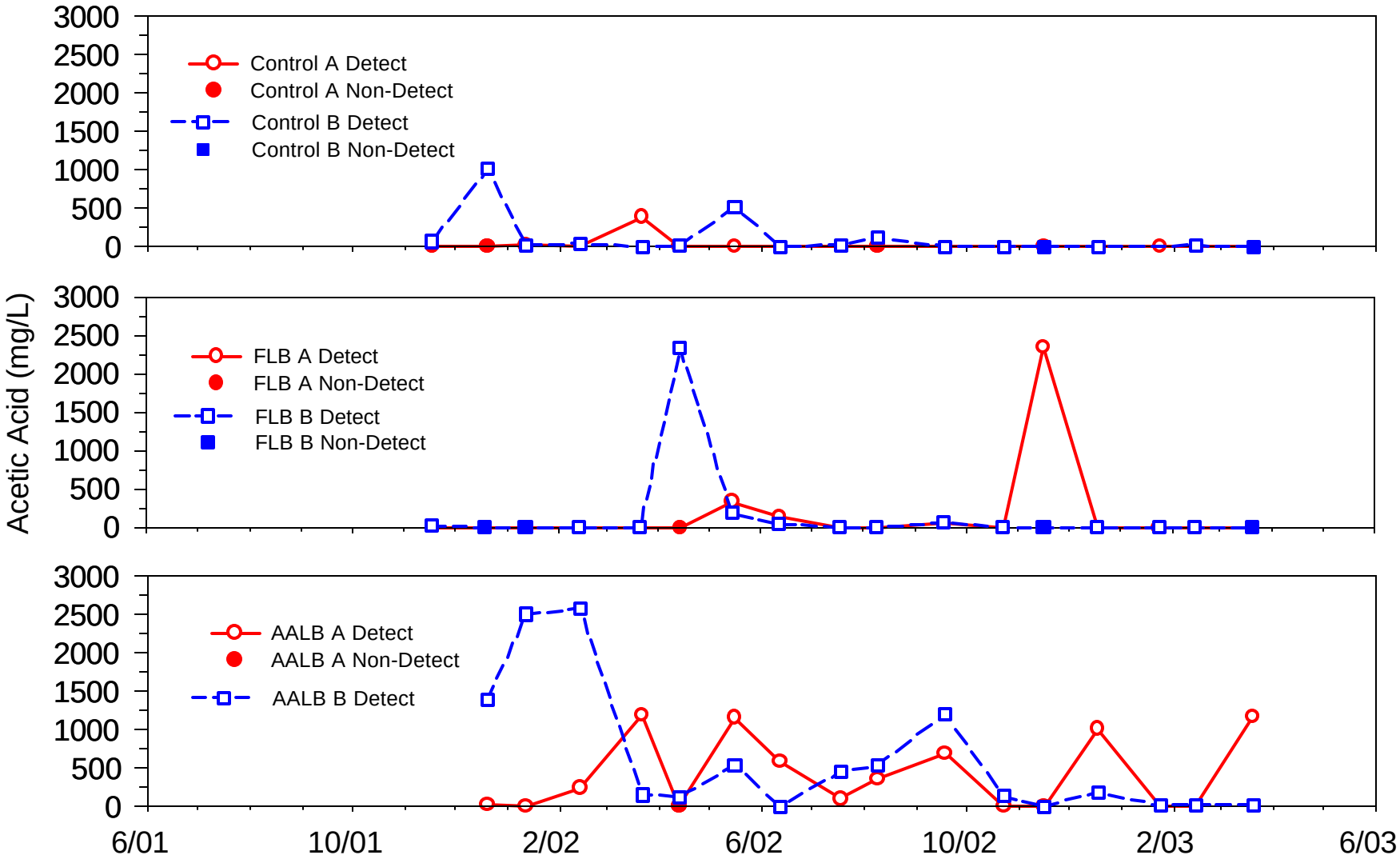


Figure 5-34. Leachate Butyric Acid vs. Time

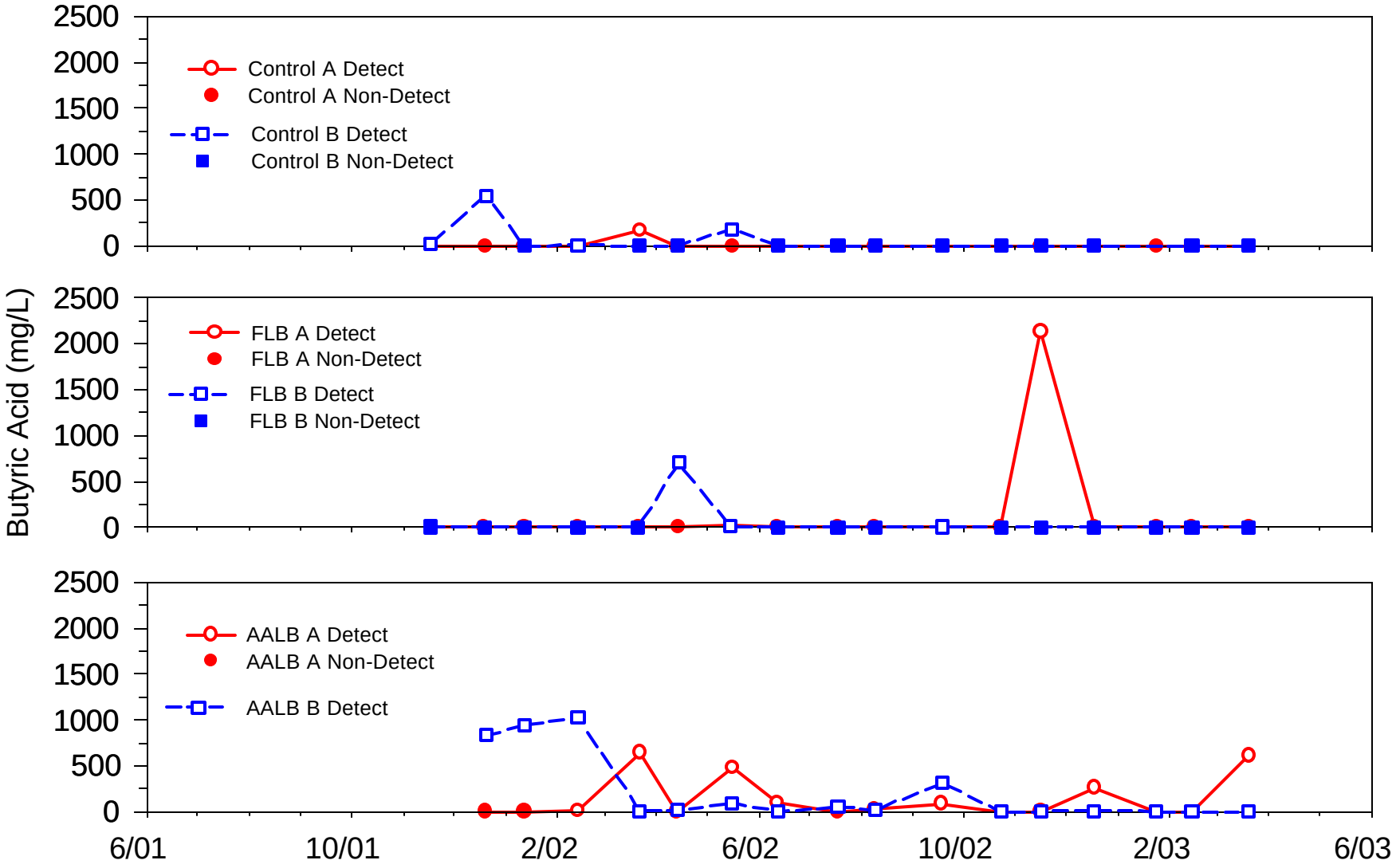


Figure 5-35. Leachate Formic Acid vs. Time

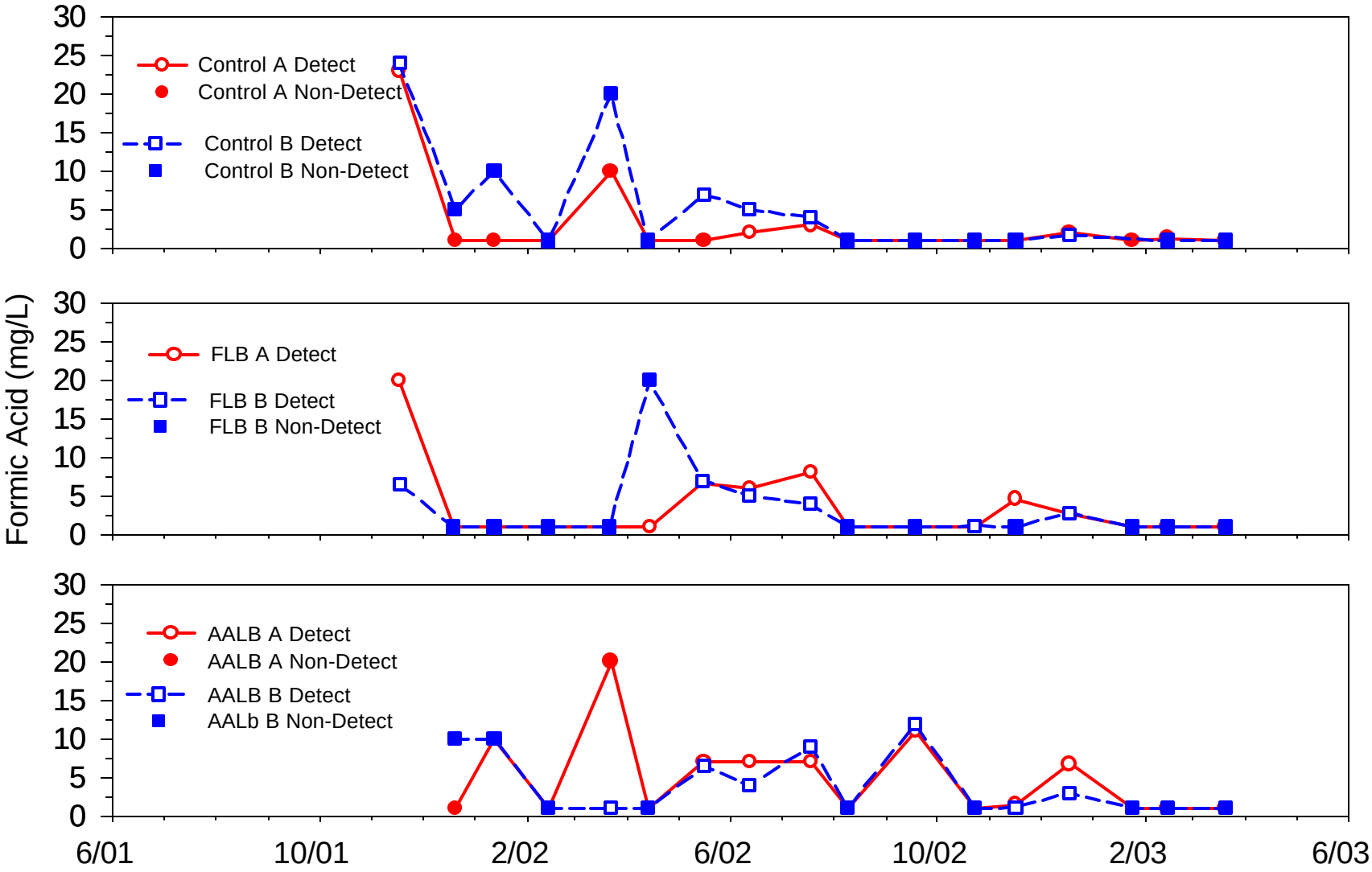


Figure 5-36. Leachate Lactic Acid vs. Time

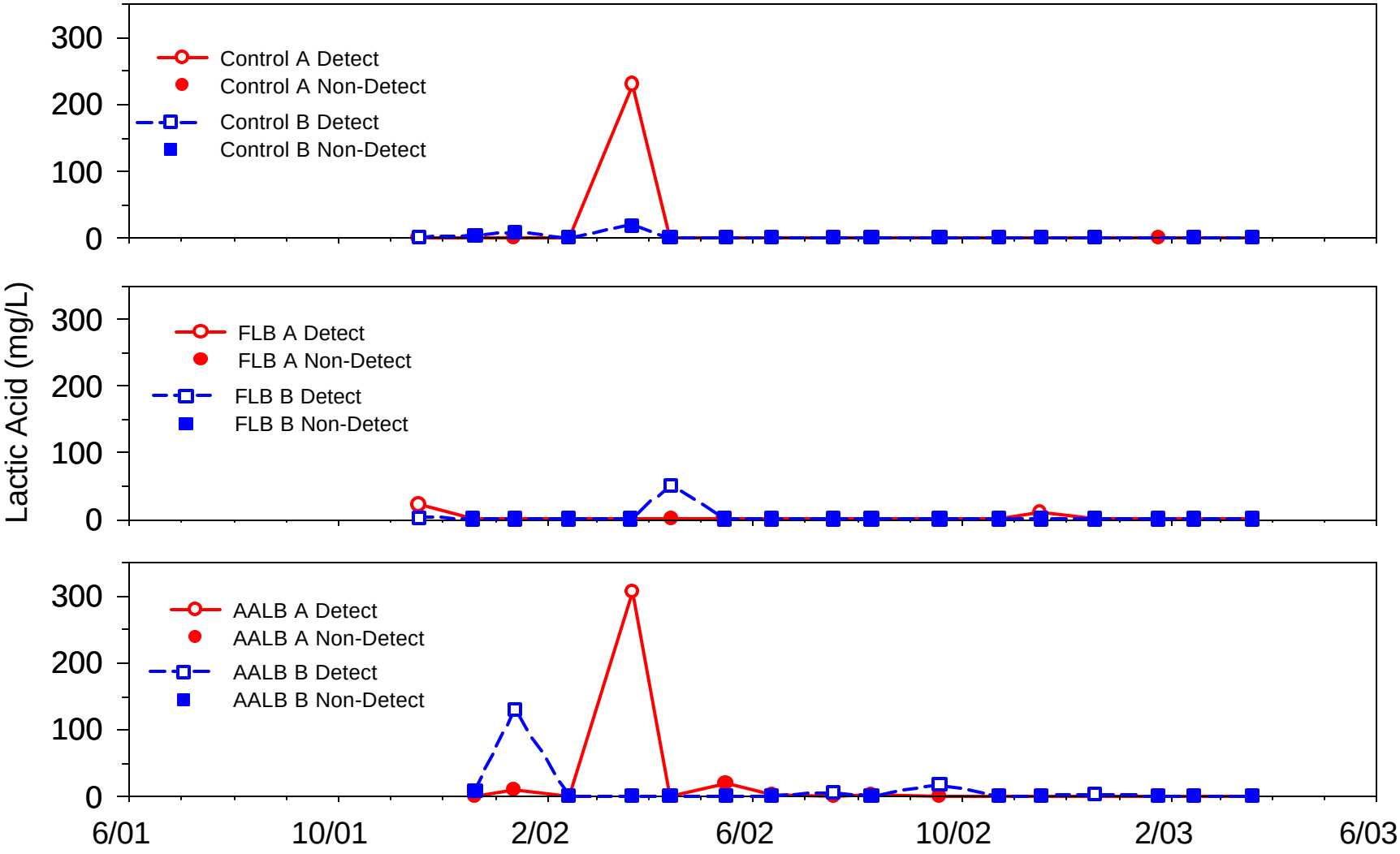


Figure 5-37. Leachate Propionic Acid vs. Time

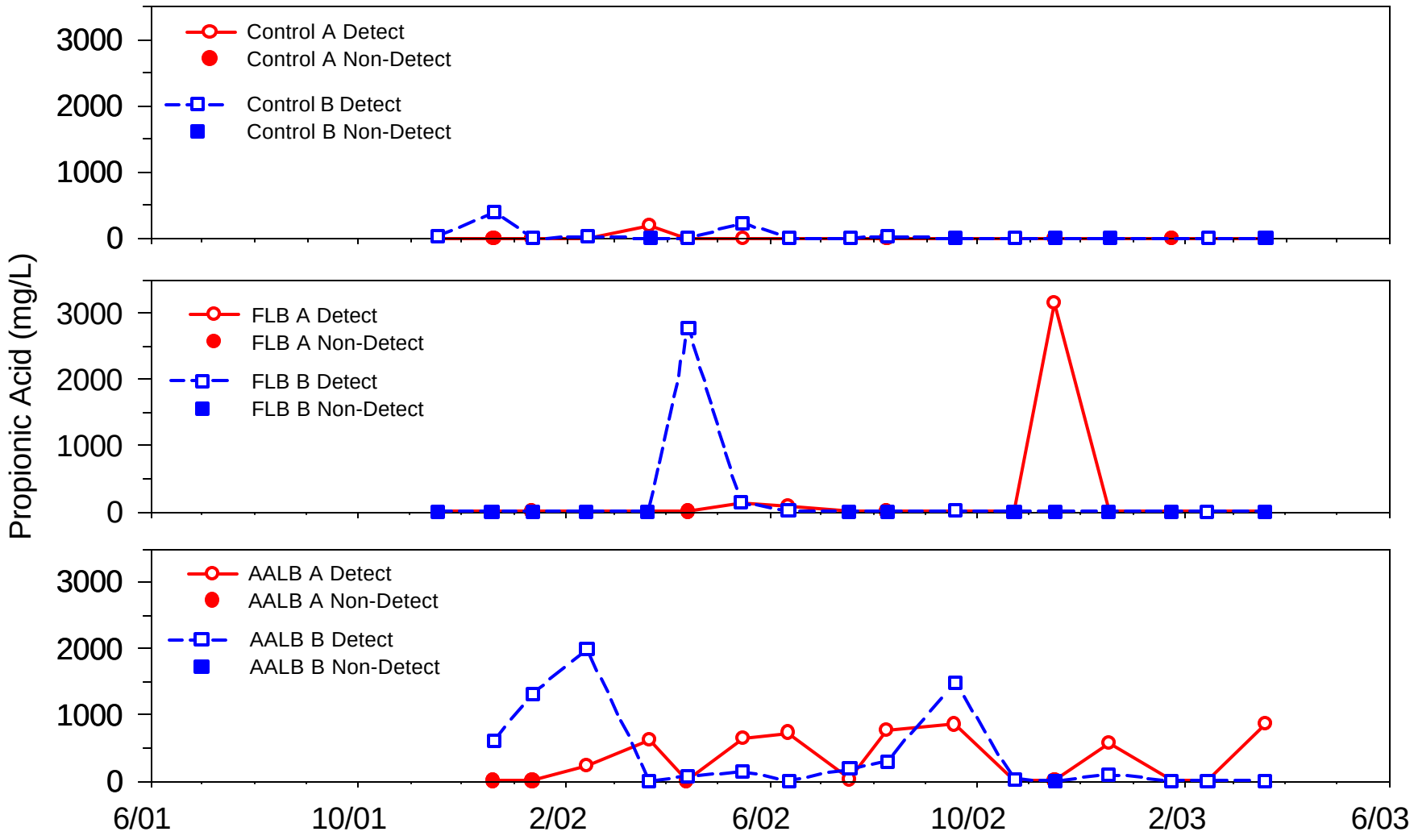
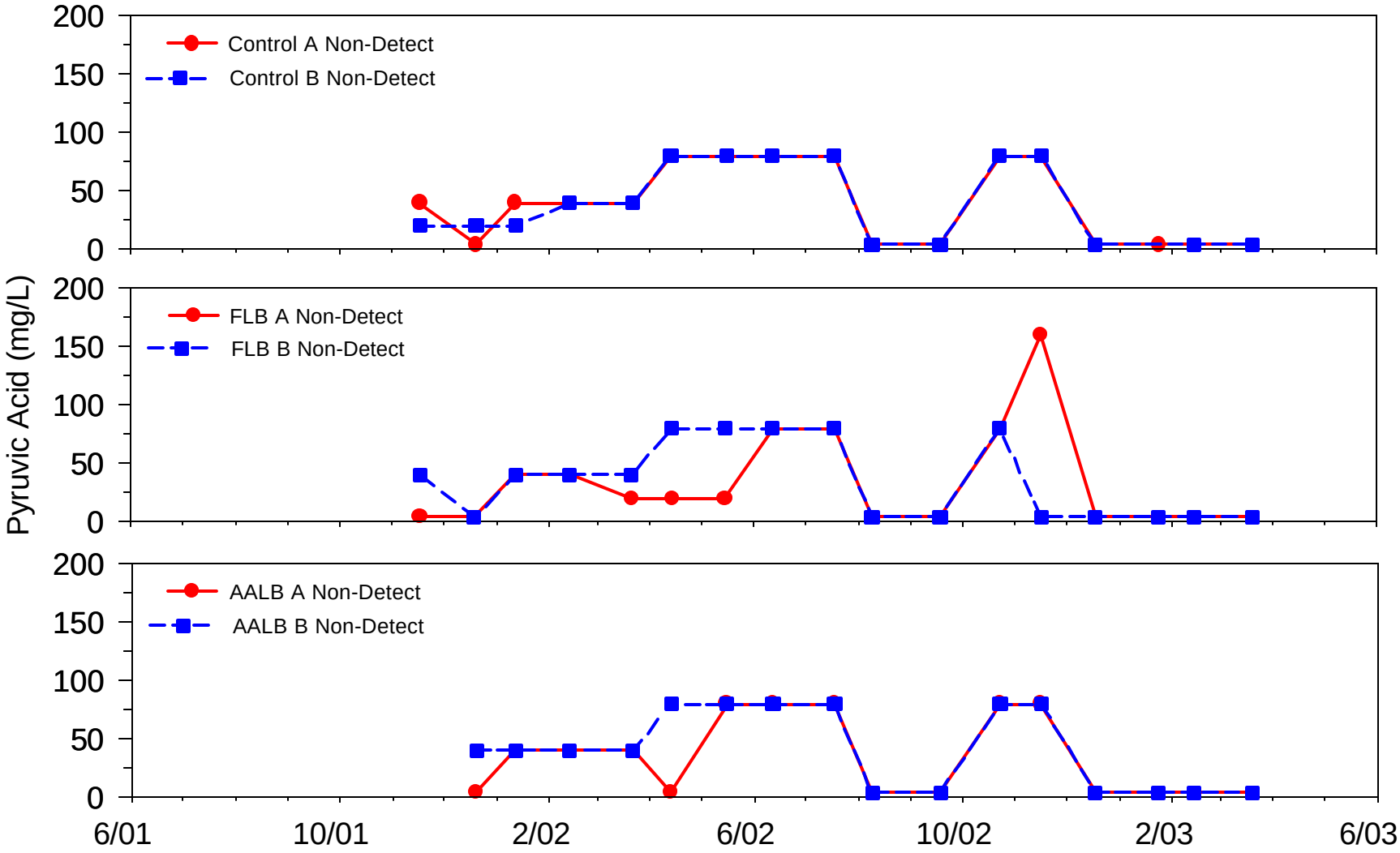


Figure 5-38. Leachate Pyruvic Acid vs. Time



Summary of Leachate Volatile Organic Compounds (VOCs)

Volatile Organic Compounds (VOCs) in leachate are summarized in a series of detection frequency tables shown in Tables 5-13 through 5-18. The tables include a list of the VOC constituents that were analyzed as well as the number of samples taken for each study cell, the number of non-detects, number of readings between 1.0 and 100 µg/l, and number of readings greater than 100 µg/l for each compound analyzed. Samples were analyzed using EPA Method 8260.

VOC constituents that were present in the Control, FLB and AALB units include benzene, toluene, ethylbenzene, total xylenes, 1,4-dichlorobenzene and methylene chloride. These VOC constituents were detected in all of the study units. A total of 9 percent of the samples were within the 1.0-100 ug/l range, with 4 percent of the samples are levels greater than 100 ug/l.

TABLE 5-13. VOLATILE ORGANIC COMPOUNDS (VOCS) IN LEACHATE CONTROL 7.3A, JUNE 26, 2001 THROUGH DECEMBER 16, 2002

VOC Compounds	Number of Readings	Number of Non-Detects (ND)	Number of Readings 1.0-100 µg/l	Number of Readings >100 µg/l
1,1,1,2-Tetrachloroethane	8	8	0	0
1,1,1-Trichloroethane	8	8	0	0
1,1,2,2-Tetrachloroethane	8	8	0	0
1,1,2-Trichloroethane	8	8	0	0
1,1-Dichloroethane	8	7	1	0
1,1-Dichloroethene	8	8	0	0
1,2,3-Trichloropropane	8	8	0	0
1,2-Dibromo-3-Chloropropane	8	8	0	0
1,2-Dibromoethane	8	8	0	0
1,2-Dichlorobenzene	8	8	0	0
1,2-Dichloroethane	8	8	0	0
1,2-Dichloropropane	8	8	0	0
1,4-Dichlorobenzene	8	2	6	0
2-Chloroethylvinyl ether	8	8	0	0
2-Hexanone	8	8	0	0
Acetone	8	5	1	2
Acrolein	8	8	0	0
Acrylonitrile	8	8	0	0
Benzene	8	0	8	0
Bromochloromethane	8	8	0	0
Bromoform	8	8	0	0
Bromomethane	8	8	0	0
Carbon Disulfide	8	7	1	0
Carbon Tetrachloride	8	8	0	0
Chlorobenzene	8	8	0	0
Chloroethane	8	8	0	0
Chloroform	8	7	1	0
Chloromethane	8	8	0	0
cis-1,2-Dichloroethene	8	8	0	0
cis-1,3-Dichloropropene	8	8	0	0
Dibromochloromethane	8	8	0	0

VOC Compounds	Number of Readings	Number of Non-Detects (ND)	Number of Readings 1.0-100 µg/l	Number of Readings >100 µg/l
Dibromomethane	8	8	0	0
Dichlorobromomethane	8	8	0	0
Dichlorodifluoromethane	8	8	0	0
Ethyl methacrylate	8	8	0	0
Ethylbenzene	8	0	8	0
Iodomethane	8	8	0	0
Methyl Ethyl Ketone	8	5	1	2
Methyl Isobutyl Ketone	8	6	0	2
Methylene chloride	8	2	6	0
Styrene	8	8	0	0
Tetrachloroethene	8	6	2	0
Toluene	8	3	3	2
Total Xylene	8	0	4	4
trans-1,2-Dichloroethene	8	8	0	0
trans-1,3-Dichloropropene	8	8	0	0
trans-1,4-Dichloro-2-butene	8	8	0	0
Trichloroethene	8	6	2	0
Trichlorofluoromethane	8	8	0	0
Vinyl acetate	8	8	0	0
Vinyl chloride	8	6	2	2
Total	**408**	**348**	**46**	**14**

Samples were analyzed using EPA Method 8260B (B)

TABLE 5-14. VOLATILE ORGANIC COMPOUNDS (VOCS) IN LEACHATE CONTROL 7.3B, JUNE 26, 2001 THROUGH DECEMBER 16, 2002

VOC Compounds	Number of Readings	Number of Non-Detects (ND)	Number of Readings 1.0-100 µg/l	Number of Readings >100 µg/l
1,1,1,2-Tetrachloroethane	7	7	0	0
1,1,1-Trichloroethane	7	7	0	0
1,1,2,2-Tetrachloroethane	7	7	0	0
1,1,2-Trichloroethane	7	7	0	0
1,1-Dichloroethane	7	7	0	0
1,1-Dichloroethene	7	7	0	0
1,2,3-Trichloropropane	7	7	0	0
1,2-Dibromo-3-Chloropropane	7	7	0	0
1,2-Dibromoethane	7	7	0	0
1,2-Dichlorobenzene	7	7	0	0
1,2-Dichlorobethane	7	7	0	0
1,2-Dichloropropane	7	7	0	0
1,4-Dichlorobenzene	7	1	6	0
2-Chloroethylvinyl ether	7	7	0	0
2-Hexanone	7	7	0	0
Acetone	7	3	1	3
Acrolein	7	7	0	0
Acrylonitrile	7	7	0	0
Benzene	7	2	5	0
Bromochloromethane	7	7	0	0

VOC Compounds	Number of Readings	Number of Non-Detects (ND)	Number of Readings 1.0-100 µg/l	Number of Readings >100 µg/l
Bromoform	7	7	0	0
Bromomethane	7	7	0	0
Carbon Disulfide	7	7	0	0
Carbon Tetrachloride	7	7	0	0
Chlorobenzene	7	7	0	0
Chloroethane	7	7	0	0
Chloroform	7	6	1	0
Chloromethane	7	7	0	0
cis-1,2-Dichloroethene	7	7	0	0
cis-1,3-Dichloropropene	7	7	0	0
Dibromochloromethane	7	7	0	0
Dibromomethane	7	7	0	0
Dichlorobromomethane	7	7	0	0
Dichlorodifluoromethane	7	7	0	0
Ethyl methacrylate	7	7	0	0
Ethylbenzene	7	0	4	2
Iodomethane	7	7	0	0
Methyl Ethyl Ketone	7	4	0	2
Methyl Isobutyl Ketone	7	6	1	0
Methylene chloride	7	5	2	0
Styrene	7	7	0	0
Tetrachloroethene	7	7	0	0
Toluene	7	2	4	1
Total Xylene	7	0	2	5
trans-1,2-Dichloroethene	7	7	0	0
trans-1,3-Dichloropropene	7	7	0	0
trans-1,4-Dichloro-2-butene	7	7	0	0
Trichloroethene	7	7	0	0
Trichlorofluoromethane	7	7	0	0
Vinyl acetate	7	7	0	0
Vinyl chloride	7	3	4	0
Total	**357**	**313**	**30**	**14**

Samples were analyzed using EPA Method 8260B (B)

TABLE 5-15. VOLATILE ORGANIC COMPOUNDS (VOCS) IN LEACHATE FLB 5.1A, JUNE 1, 2001 THROUGH DECEMBER 16, 2002

VOC Compounds	Number of Readings	Number of Non-Detects (ND)	Number of Readings 1.0-100 µg/l	Number of Readings >100 µg/l
1,1,1,2-Tetrachloroethane	9	9	0	0
1,1,1-Trichloroethane	9	9	0	0
1,1,2,2-Tetrachloroethane	9	9	0	0
1,1,2-Trichloroethane	9	9	0	0
1,1-Dichloroethane	9	9	0	0
1,1-Dichloroethene	9	9	0	0
1,2,3-Trichloropropane	9	9	0	0
1,2-Dibromo-3-Chloropropane	9	9	0	0
1,2-Dibromoethane	9	9	0	0

VOC Compounds	Number of Readings	Number of Non-Detects (ND)	Number of Readings 1.0-100 µg/l	Number of Readings >100 µg/l
1,2-Dichlorobenzene	9	9	0	0
1,2-Dichloroethane	9	9	0	0
1,2-Dichloropropane	9	9	0	0
1,4-Dichlorobenzene	9	1	8	0
2-Chloroethylvinyl ether	9	9	0	0
2-Hexanone	9	8	0	1
Acetone	9	7	1	1
Acrolein	9	0	0	0
Acrylonitrile	9	9	0	0
Benzene	9	8	1	0
Bromochloromethane	9	9	0	0
Bromoform	9	9	0	0
Bromomethane	9	9	0	0
Carbon Disulfide	9	9	0	0
Carbon Tetrachloride	9	9	0	0
Chlorobenzene	9	9	0	0
Chloroethane	9	9	0	0
Chloroform	9	9	0	0
Chloromethane	9	9	0	0
Cis-1,2-Dichloroethene	9	9	0	0
Cis-1,3-Dichloropropene	9	9	0	0
Dibromochloromethane	9	9	0	0
Dibromomethane	9	9	0	0
Dichlorobromomethane	9	9	0	0
Dichlorodifluoromethane	9	9	0	0
Ethyl methacrylate	9	9	0	0
Ethylbenzene	9	0	9	0
Iodomethane	9	9	0	0
Methyl Ethyl Ketone	9	4	3	2
Methyl Isobutyl Ketone	9	7	2	0
Methylene chloride	9	4	5	0
Styrene	9	9	0	0
Tetrachloroethene	9	9	0	0
Toluene	9	1	8	0
Total Xylene	9	0	2	7
Trans-1,2-Dichloroethene	9	9	0	0
Trans-1,3-Dichloropropene	9	9	0	0
Trans-1,4-Dichloro-2-butene	9	9	0	0
Trichloroethene	9	9	0	0
Trichlorofluoromethane	9	9	0	0
Vinyl acetate	9	9	0	0
Vinyl chloride	9	8	1	0
Total	**459**	**408**	**40**	**11**

Samples were analyzed using EPA Method 8260B (B)

TABLE 5-16. VOLATILE ORGANIC COMPOUNDS (VOCS) IN LEACHATE FLB 5.2B, JUNE 1, 2001 THROUGH DECEMBER 16, 2002

VOC Compounds	Number of Readings	Number of Non-Detects (ND)	Number of Readings 1.0-100 µg/l	Number of Readings >100 µg/l
1,1,1,2-Tetrachloroethane	8	8	0	0
1,1,1-Trichloroethane	8	8	0	0
1,1,2,2-Tetrachloroethane	8	8	0	0
1,1,2-Trichloroethane	8	8	0	0
1,1-Dichloroethane	8	8	0	0
1,1-Dichloroethene	8	8	0	0
1,2,3-Trichloropropane	8	8	0	0
1,2-Dibromo-3-Chloropropane	8	8	0	0
1,2-Dibromoethane	8	7	1	0
1,2-Dichlorobenzene	8	8	0	0
1,2-Dichloroethane	8	7	1	0
1,2-Dichloropropane	8	8	0	0
1,4-Dichlorobenzene	8	1	7	0
2-Chloroethylvinyl ether	8	8	0	0
2-Hexanone	8	8	0	0
Acetone	8	3	3	2
Acrolein	8	8	0	0
Acrylonitrile	8	8	0	0
Benzene	8	2	6	0
Bromochloromethane	8	8	0	0
Bromoform	8	8	0	0
Bromomethane	8	8	0	0
Carbon Disulfide	8	8	0	0
Carbon Tetrachloride	8	8	0	0
Chlorobenzene	8	7	1	0
Chloroethane	8	8	0	0
Chloroform	8	7	1	0
Chloromethane	8	8	0	0
cis-1,2-Dichloroethene	8	8	0	0
cis-1,3-Dichloropropene	8	8	0	0
Dibromochloromethane	8	8	0	0
Dibromomethane	8	8	0	0
Dichlorobromomethane	8	8	0	0
Dichlorodifluoromethane	8	8	0	0
Ethyl methacrylate	8	8	0	0
Ethylbenzene	8	0	7	1
Iodomethane	8	8	0	0
Methyl Ethyl Ketone	8	5	2	1
Methyl Isobutyl Ketone	8	7	1	0
Methylene chloride	8	5	3	0
Styrene	8	8	0	0
Tetrachloroethene	8	8	0	0
Toluene	8	2	6	0
Total Xylene	8	0	0	8
trans-1,2-Dichloroethene	8	8	0	0
trans-1,3-Dichloropropene	8	8	0	0
trans-1,4-Dichloro-2-butene	8	8	0	0

VOC Compounds	Number of Readings	Number of Non-Detects (ND)	Number of Readings 1.0-100 µg/l	Number of Readings >100 µg/l
Trichloroethene	8	8	0	0
Trichlorofluoromethane	8	8	0	0
Vinyl acetate	8	8	0	0
Vinyl chloride	8	7	1	0
Total	**408**	**356**	**40**	**12**

Samples were analyzed using EPA Method 8260B (B)

TABLE 5-17. VOLATILE ORGANIC COMPOUNDS (VOCS) IN LEACHATE AALB 7.4A, MARCH 20, 2002 THROUGH DECEMBER 16, 2002

VOC Compounds	Number of Readings	Number of Non-Detects (ND)	Number of Readings 1.0-100 µg/l	Number of Readings >100 µg/l
1,1,1,2-Tetrachloroethane	4	4	0	0
1,1,1-Trichloroethane	4	4	0	0
1,1,2,2-Tetrachloroethane	4	4	0	0
1,1,2-Trichloroethane	4	4	0	0
1,1-Dichloroethane	4	4	0	0
1,1-Dichloroethene	4	4	0	0
1,2,3-Trichloropropane	4	4	0	0
1,2-Dibromo-3-Chloropropane	4	4	0	0
1,2-Dibromoethane	4	4	0	0
1,2-Dichlorobenzene	4	4	0	0
1,2-Dichlorobenzene	4	4	0	0
1,2-Dichloropropane	4	4	0	0
1,4-Dichlorobenzene	4	4	0	0
2-Chloroethylvinyl ether	4	4	0	0
2-Hexanone	4	4	0	0
Acetone	4	1	0	3
Acrolein	4	4	0	0
Acrylonitrile	4	4	0	0
Benzene	4	3	1	0
Bromochloromethane	4	4	0	0
Bromoform	4	4	0	0
Bromomethane	4	4	0	0
Carbon Disulfide	4	4	0	0
Carbon Tetrachloride	4	4	0	0
Chlorobenzene	4	4	0	0
Chloroethane	4	4	0	0
Chloroform	4	4	0	0
Chloromethane	4	4	0	0
cis-1,2-Dichloroethene	4	4	0	0
cis-1,3-Dichloropropene	4	4	0	0
Dibromochloromethane	4	4	0	0
Dibromomethane	4	4	0	0
Dichlorobromomethane	4	4	0	0
Dichlorodifluoromethane	4	4	0	0
Ethyl methacrylate	4	4	0	0

VOC Compounds	Number of Readings	Number of Non-Detects (ND)	Number of Readings 1.0-100 µg/l	Number of Readings >100 µg/l
Ethylbenzene	4	0	4	0
Iodomethane	4	4	0	0
Methyl Ethyl Ketone	4	1	0	3
Methyl Isobutyl Ketone	4	0	2	2
Methylene chloride	4	3	1	0
Styrene	4	4	0	0
Tetrachloroethene	4	4	0	0
Toluene	4	0	2	2
Total Xylene	4	0	3	1
trans-1,2-Dichloroethene	4	4	0	0
trans-1,3-Dichloropropene	4	4	0	0
trans-1,4-Dichloro-2-butene	4	4	0	0
Trichloroethene	4	4	0	0
Trichlorofluoromethane	4	4	0	0
Vinyl acetate	4	4	0	0
Vinyl chloride	4	2	2	0
Total	**204**	**178**	**15**	**11**

Samples were analyzed using EPA Method 8260B (B)

TABLE 5-18. VOLATILE ORGANIC COMPOUNDS (VOCS) IN LEACHATE AALB-7.4B, MARCH 20, 2002 THROUGH DECEMBER 16, 2002

VOC Compounds	Number of Readings	Number of Non-Detects (ND)	Number of Readings 1.0-100 µg/l	Number of Readings >100 µg/l
1,1,1,2-Tetrachloroethane	6	6	0	0
1,1,1-Trichloroethane	6	6	0	0
1,1,2,2-Tetrachloroethane	6	6	0	0
1,1,2-Trichloroethane	6	6	0	0
1,1-Dichloroethane	6	6	0	0
1,1-Dichloroethene	6	6	0	0
1,2,3-Trichloropropane	6	6	0	0
1,2-Dibromo-3-Chloropropane DBCP	6	6	0	0
1,2-Dibromoethane (EDB)	6	6	0	0
1,2-Dichlorobenzene	6	6	0	0
1,2-Dichlorobenzene	6	6	0	0
1,2-Dichloropropane	6	6	0	0
1,4-Dichlorobenzene	6	5	1	0
2-Chloroethylvinyl ether	6	6	0	0
2-Hexanone	6	6	0	0
Acetone	6	0	0	6
Acrolein	6	6	0	0
Acrylonitrile	6	6	0	0
Benzene	6	2	4	0
Bromochloromethane	6	6	0	0
Bromoform	6	6	0	0
Bromomethane	6	6	0	0
Carbon Disulfide	6	6	0	0
Carbon Tetrachloride	6	6	0	0

VOC Compounds	Number of Readings	Number of Non-Detects (ND)	Number of Readings 1.0-100 µg/l	Number of Readings >100 µg/l
Chlorobenzene	6	6	0	0
Chloroethane	6	6	0	0
Chloroform	6	6	0	0
Chloromethane	6	6	0	0
cis-1,2-Dichloroethene	6	6	0	0
cis-1,3-Dichloropropene	6	6	0	0
Dibromochloromethane	6	6	0	0
Dibromomethane	6	6	0	0
Dichlorobromomethane	6	6	0	0
Dichlorodifluoromethane	6	6	0	0
Ethyl methacrylate	6	6	0	0
Ethylbenzene	6	0	6	0
Iodomethane	6	6	0	0
Methyl Ethyl Ketone	6	0	0	6
Methyl Isobutyl Ketone	6	0	1	5
Methylene chloride	6	2	4	0
Styrene	6	5	1	0
Tetrachloroethene	6	6	0	0
Toluene	6	0	0	6
Total Xylene	6	0	1	5
trans-1,2-Dichloroethene	6	6	0	0
trans-1,3-Dichloropropene	6	6	0	0
trans-1,4-Dichloro-2-butene	6	6	0	0
Trichloroethene	6	5	1	0
Trichlorofluoromethane	6	6	0	0
Vinyl acetate	6	6	0	0
Vinyl chloride	6	2	4	0
Total	**306**	**261**	**23**	**22**

Samples were analyzed using EPA Method 8260B (B)

Summary of Leachate Semi-Volatile Organic Compounds (SVOCs)

Tables 5-19 through 5-24 provide a summary of the semi-volatile organic compounds (SVOCs) in leachate. Detection frequency tables showing the SVOC compounds that were analyzed using EPA Method 8270.

Common constituents for the three units of study include diethyl phthalate, phenol, 1,4-dioxane, naphthalene, cresol, m, o and p. Approximately 1 percent of the samples had concentrations within the 1.0-100 ug/l range. Less than 1 percent of the samples were at concentrations greater than 100 ug/l.

TABLE 5-19. SEMI-VOLATILE ORGANIC COMPOUNDS (SVOCS) IN LEACHATE CONTROL 7.3A, JUNE 26, 2001 THROUGH DECEMBER 16, 2002

SVOC Compounds	Number of Readings	Number of Non-Detects (ND)	Number of Readings 1.0-100 µg/l	Number of Readings >100 µg/l
0,0,0-Triethylphosphorothioate	8	8	0	0
1,2,4,5-Tetrachlorobenzene	8	8	0	0
1,2,4-Trichlorobenzene	8	8	0	0
1,2-Dichlorobenzene	8	8	0	0
1,3-Dichlorobenzene	8	8	0	0
1,4-Dichlorobenzene	8	3	5	0
1,4-Dioxane	8	6	2	0
1,4-Naphthoquinone	8	8	0	0
1-Naphthylamine	8	8	0	0
2,2'-Oxybis(1-Chloropropane)	8	8	0	0
2,3,4,6-Tetrachlorophenol	8	8	0	0
2,4,5-Trichlorophenol	8	8	0	0
2,4,6-Trichlorophenol	8	8	0	0
2,4-Dichlorophenol	8	8	0	0
2,4-Dimethylphenol	8	6	2	0
2,4-Dinitrophenol	8	8	0	0
2,4-Dinitrotoluene	8	8	0	0
2,6-Dichlorophenol	8	8	0	0
2,6-Dinitrotoluene	8	8	0	0
2-Acetylaminofluorene	8	8	0	0
2-Chloronaphthalene	8	8	0	0
2-Chlorophenol	8	8	0	0
2-Methylnaphthalene	8	8	0	0
2-Naphthylamine	8	8	0	0
2-Nitroaniline	8	8	0	0
2-Nitrophenol	8	8	0	0
2-sec-Butyl-4,6-dinitrophenol	8	8	0	0
3,3'-Dichlorobenzidine	8	8	0	0
3,3'-Dimethylbenzidine	8	8	0	0
3-Methylcholanthrene	8	8	0	0
3-Nitroaniline	8	8	0	0
4-Aminobiphenyl	8	8	0	0
4-Bromophenyl phenyl ether	8	8	0	0
4-Chloroaniline	8	8	0	0
4-Chlorophenyl phenyl ether	8	8	0	0
4-Nitroaniline	8	8	0	0
4-Nitrophenol	8	8	0	0
5-Nitro-o-toluidine	8	8	0	0
7,12-Dimethylbenz(a)anthracene	8	8	0	0
Acenaphthene	8	8	0	0

SVOC Compounds	Number of Readings	Number of Non-Detects (ND)	Number of Readings 1.0-100 µg/l	Number of Readings >100 µg/l
Acenaphthylene	8	8	0	0
Acetophenone	8	8	0	0
Anthracene	8	8	0	0
Benzo(a)anthracene	8	8	0	0
Benzo(a)pyrene	8	8	0	0
Benzo(b)fluoranthene	8	8	0	0
Benzo(ghi)perylene	8	8	0	0
Benzo(k)fluoranthene	8	8	0	0
Benzyl alcohol	8	6	0	2
Bis(2-chloroethoxy) methane	8	8	0	0
Bis(2-chloroethyl) ether	8	8	0	0
Bis(2-ethylhexyl) phthalate	8	7	1	0
Butyl benzyl phthalate	8	8	0	0
Chlorobenzilate	8	8	0	0
Chrysene	8	8	0	0
Cresol, 4,6-Dinitro-O-	8	8	0	0
Cresol, m-	8	6	0	2
Cresol, o-	8	8	0	0
Cresol, p-	8	6	0	2
Cresol, p-Chloro-m-	8	8	0	0
Diallate	8	8	0	0
Dibenzo(a,h)anthracene	8	8	0	0
Dibenzofuran	8	8	0	0
Diethyl phthalate	8	7	1	0
Dimethoate	8	8	0	0
Dimethyl phthalate	8	8	0	0
Di-n-butyl phthalate	8	8	0	0
Di-n-octyl phthalate	8	8	0	0
Diphenylamine	8	8	0	0
Disulfoton	8	8	0	0
Ethyl methane sulfonate	8	8	0	0
Famphur	8	8	0	0
Fluoranthene	8	8	0	0
Fluorene	8	8	0	0
Hexachlorobenzene	8	8	0	0
Hexachlorobutadiene	8	8	0	0
Hexachlorocyclopentadiene	8	8	0	0
Hexachloroethane	8	8	0	0
Hexachloropropene	8	8	0	0
Indeno(1,2,3-cd)pyrene	8	8	0	0
Isodrin	8	8	0	0
Isophorone	8	8	0	0
Isosafrole	8	8	0	0
Kepone	8	8	0	0
m-Dinitrobenzene	8	8	0	0
Methapyrilene	8	8	0	0
Methyl methanesulfonate	8	8	0	0
Methyl parathion	8	8	0	0
Naphthalene	8	8	0	0

SVOC Compounds	Number of Readings	Number of Non-Detects (ND)	Number of Readings 1.0-100 µg/l	Number of Readings >100 µg/l
Nitrobenzene	8	8	0	0
N-Nitrosodiethylamine	8	8	0	0
N-Nitrosodimethylamine	8	8	0	0
N-Nitrosodi-n-butylamine	8	8	0	0
N-Nitroso-Di-n-propylamine	8	8	0	0
N-nitrosodiphenylamine	8	8	0	0
N-Nitrosomethylethylamine	8	8	0	0
N-Nitrosopiperidine	8	8	0	0
N-Nitrosopyrrolidine	8	8	0	0
o-Toluidine	8	8	0	0
Parathion	8	8	0	0
p-Dimethylaminoazobenzene	8	8	0	0
Pentachlorobenzene	8	8	0	0
Pentachloronitrobenzene	8	8	0	0
Pentachlorophenol	8	8	0	0
Phenacetin	8	8	0	0
Phenanthrene	8	8	0	0
Phenol	8	6	2	0
Phorate	8	8	0	0
p-Phenylenediamine	8	8	0	0
Pronamide	8	8	0	0
Pyrene	8	8	0	0
Safrole	8	8	0	0
Sym-Trinitrobenzene	8	8	0	0
Thionazin	8	8	0	0
Total	**456**	**443**	**7**	**6**

Samples were analyzed using EPA Method 8270

TABLE 5-20. SEMI-VOLATILE ORGANIC COMPOUNDS (SVOCS) IN LEACHATE: CONTROL 7.3B, JUNE 26, 2001 THROUGH DECEMBER16, 2003

SVOC Compounds	Number of Readings	Number of Non-Detects (ND)	Number of Readings 1.0-100 µg/l	Number of Readings >100 µg/l
0,0,0-Triethylphosphorothioate	7	7	0	0
1,2,4,5-Tetrachlorobenzene	7	7	0	0
1,2,4-Trichlorobenzene	7	7	0	0
1,2-Dichlorobenzene	7	7	0	0
1,3-Dichlorobenzene	7	7	0	0
1,4-Dichlorobenzene	7	3	4	0
1,4-Dioxane	7	7	0	0
1,4-Naphthoquinone	7	7	0	0
1-Naphthylamine	7	7	0	0
2,2'-Oxybis(1-Chloropropane)	7	7	0	0
2,3,4,6-Tetrachlorophenol	7	7	0	0
2,4,5-Trichlorophenol	7	7	0	0
2,4,6-Trichlorophenol	7	7	0	0
2,4-Dichlorophenol	7	7	0	0

SVOC Compounds	Number of Readings	Number of Non-Detects (ND)	Number of Readings 1.0-100 µg/l	Number of Readings >100 µg/l
2,4-Dimethylphenol	7	7	0	0
2,4-Dinitrophenol	7	7	0	0
2,4-Dinitrotoluene	7	7	0	0
2,6-Dichlorophenol	7	7	0	0
2,6-Dinitrotoluene	7	7	0	0
2-Acetylaminofluorene	7	7	0	0
2-Chloronaphthalene	7	7	0	0
2-Chlorophenol	7	7	0	0
2-Methylnaphthalene	7	7	0	0
2-Naphthylamine	7	7	0	0
2-Nitroaniline	7	7	0	0
2-Nitrophenol	7	7	0	0
2-sec-Butyl-4,6-dinitrophenol	7	7	0	0
3,3'-Dichlorobenzidine	7	7	0	0
3,3'-Dimethylbenzidine	7	7	0	0
3-Methylcholanthrene	7	7	0	0
3-Nitroaniline	7	7	0	0
4-Aminobiphenyl	7	7	0	0
4-Bromophenyl phenyl ether	7	7	0	0
4-Chloroaniline	7	7	0	0
4-Chlorophenyl phenyl ether	7	7	0	0
4-Nitroaniline	7	7	0	0
4-Nitrophenol	7	7	0	0
5-Nitro-o-toluidine	7	7	0	0
7,12-Dimethylbenz(a)anthracene	7	7	0	0
Acenaphthene	7	7	0	0
Acenaphthylene	7	7	0	0
Acetophenone	7	7	0	0
Anthracene	7	7	0	0
Benzo(a)anthracene	7	7	0	0
Benzo(a)pyrene	7	7	0	0
Benzo(b)fluoranthene	7	7	0	0
Benzo(ghi)perylene	7	7	0	0
Benzo(k)fluoranthene	7	7	0	0
Benzyl alcohol	7	7	0	0
Bis(2-chloroethoxy) methane	7	7	0	0
Bis(2-chloroethyl) ether	7	7	0	0
Bis(2-ethylhexyl) phthalate	7	6	1	0
Butyl benzyl phthalate	7	7	0	0
Chlorobenzilate	7	7	0	0
Chrysene	7	7	0	0
Cresol, 4,6-Dinitro-O-	7	7	0	0
Cresol, m-	7	7	0	0
Cresol, o-	7	7	0	0
Cresol, p-	7	6	1	0
Cresol, p-Chloro-m-	7	7	0	0
Diallate	7	7	0	0
Dibenzo(a,h)anthracene	7	7	0	0
Dibenzofuran	7	7	0	0

SVOC Compounds	Number of Readings	Number of Non-Detects (ND)	Number of Readings 1.0-100 µg/l	Number of Readings >100 µg/l
Diethyl phthalate	7	4	3	0
Dimethoate	7	7	0	0
Dimethyl phthalate	7	7	0	0
Di-n-butyl phthalate	7	7	0	0
Di-n-octyl phthalate	7	7	0	0
Diphenylamine	7	7	0	0
Disulfoton	7	7	0	0
Ethyl methane sulfonate	7	7	0	0
Famphur	7	7	0	0
Fluoranthene	7	7	0	0
Fluorene	7	7	0	0
Hexachlorobenzene	7	7	0	0
Hexachlorobutadiene	7	7	0	0
Hexachlorocyclopentadiene	7	7	0	0
Hexachloroethane	7	7	0	0
Hexachloropropene	7	7	0	0
Indeno(1,2,3-cd)pyrene	7	7	0	0
Isodrin	7	7	0	0
Isophorone	7	7	0	0
Isosafrole	7	7	0	0
Kepone	7	7	0	0
m-Dinitrobenzene	7	7	0	0
Methapyrilene	7	7	0	0
Methyl methanesulfonate	7	7	0	0
Methyl parathion	7	7	0	0
Naphthalene	7	7	0	0
Nitrobenzene	7	7	0	0
N-Nitrosodiethylamine	7	7	0	0
N-Nitrosodimethylamine	7	7	0	0
N-Nitrosodi-n-butylamine	7	7	0	0
N-Nitroso-Di-n-propylamine	7	7	0	0
N-nitrosodiphenylamine	7	7	0	0
N-Nitrosomethylethylamine	7	7	0	0
N-Nitrosopiperidine	7	7	0	0
N-Nitrosopyrrolidine	7	7	0	0
o-Toluidine	7	7	0	0
Parathion	7	7	0	0
p-Dimethylaminoazobenzene	7	7	0	0
Pentachlorobenzene	7	7	0	0
Pentachloronitrobenzene	7	7	0	0
Pentachlorophenol	7	7	0	0
Phenacetin	7	7	0	0
Phenanthrene	7	7	0	0
Phenol	7	6	1	0
Phorate	7	7	0	0
p-Phenylenediamine	7	7	0	0
Pronamide	7	7	0	0
Pyrene	7	7	0	0
Safrole	7	7	0	0

SVOC Compounds	Number of Readings	Number of Non-Detects (ND)	Number of Readings 1.0-100 µg/l	Number of Readings >100 µg/l
Sym-Trinitrobenzene	7	7	0	0
Thionazin	7	7	0	0
Total	**798**	**788**	**10**	**0**

Samples were analyzed using EPA Method 8270

TABLE 5-21. SEMI-VOLATILE ORGANIC COMPOUNDS (SVOCS) IN LEACHATE FLB 5.1A, JUNE 1, 2001 THROUGH DECEMBER 16, 2002

SVOC Compounds	Number of Readings	Number of Non-Detects (ND)	Number of Readings 1.0-100 µg/l	Number of Readings >100 µg/l
0,0,0-Triethylphosphorothioate	9	9	0	0
1,2,4,5-Tetrachlorobenzene	9	9	0	0
1,2,4-Trichlorobenzene	9	9	0	0
1,2-Dichlorobenzene	9	9	0	0
1,3-Dichlorobenzene	9	9	0	0
1,4-Dichlorobenzene	9	9	0	0
1,4-Dioxane	9	4	4	1
1,4-Naphthoquinone	9	9	0	0
1-Naphthylamine	9	9	0	0
2,2'-Oxybis(1-Chloropropane)	9	9	0	0
2,3,4,6-Tetrachlorophenol	9	9	0	0
2,4,5-Trichlorophenol	9	9	0	0
2,4,6-Trichlorophenol	9	9	0	0
2,4-Dichlorophenol	9	9	0	0
2,4-Dimethylphenol	9	8	1	0
2,4-Dinitrophenol	9	9	0	0
2,4-Dinitrotoluene	9	9	0	0
2,6-Dichlorophenol	9	9	0	0
2,6-Dinitrotoluene	9	9	0	0
2-Acetylaminofluorene	9	9	0	0
2-Chloronaphthalene	9	9	0	0
2-Chlorophenol	9	9	0	0
2-Methylnaphthalene	9	9	0	0
2-Naphthylamine	9	9	0	0
2-Nitroaniline	9	9	0	0
2-Nitrophenol	9	9	0	0
2-sec-Butyl-4,6-dinitrophenol	9	9	0	0
3,3'-Dichlorobenzidine	9	9	0	0
3,3'-Dimethylbenzidine	9	9	0	0
3-Methylcholanthrene	9	9	0	0
3-Nitroaniline	9	9	0	0
4-Aminobiphenyl	9	9	0	0
4-Bromophenyl phenyl ether	9	9	0	0
4-Chloroaniline	9	9	0	0
4-Chlorophenyl phenyl ether	9	9	0	0
4-Nitroaniline	9	9	0	0

SVOC Compounds	Number of Readings	Number of Non-Detects (ND)	Number of Readings 1.0-100 µg/l	Number of Readings >100 µg/l
4-Nitrophenol	9	9	0	0
5-Nitro-o-toluidine	9	9	0	0
7,12-Dimethylbenz(a)anthracene	9	9	0	0
Acenaphthene	9	9	0	0
Acenaphthylene	9	9	0	0
Acetophenone	9	9	0	0
Anthracene	9	9	0	0
Benzo(a)anthracene	9	9	0	0
Benzo(a)pyrene	9	9	0	0
Benzo(b)fluoranthene	9	9	0	0
Benzo(ghi)perylene	9	9	0	0
Benzo(k)fluoranthene	9	9	0	0
Benzyl alcohol	9	9	0	0
Bis(2-chloroethoxy) methane	9	9	0	0
Bis(2-chloroethyl) ether	9	9	0	0
Bis(2-ethylhexyl) phthalate	9	8	0	1
Butyl benzyl phthalate	9	9	0	0
Chlorobenzilate	9	9	0	0
Chrysene	9	9	0	0
Cresol, 4,6-Dinitro-O-	9	9	0	0
Cresol, m-	9	6	1	2
Cresol, o-	9	9	0	0
Cresol, p-	9	6	1	2
Cresol, p-Chloro-m-	9	9	0	0
Diallate	9	9	0	0
Dibenzo(a,h)anthracene	9	9	0	0
Dibenzofuran	9	9	0	0
Diethyl phthalate	9	9	0	0
Dimethoate	9	9	0	0
Dimethyl phthalate	9	9	0	0
Di-n-butyl phthalate	9	9	0	0
Di-n-octyl phthalate	9	9	0	0
Diphenylamine	9	9	0	0
Disulfoton	9	9	0	0
Ethyl methane sulfonate	9	9	0	0
Famphur	9	9	0	0
Fluoranthene	9	9	0	0
Fluorene	9	9	0	0
Hexachlorobenzene	9	9	0	0
Hexachlorobutadiene	9	9	0	0
Hexachlorocyclopentadiene	9	9	0	0
Hexachloroethane	9	9	0	0
Hexachloropropene	9	9	0	0
Indeno(1,2,3-cd)pyrene	9	9	0	0
Isodrin	9	9	0	0
Isophorone	9	9	0	0
Isosafrole	9	9	0	0
Kepone	9	9	0	0
m-Dinitrobenzene	9	9	0	0

SVOC Compounds	Number of Readings	Number of Non-Detects (ND)	Number of Readings 1.0-100 µg/l	Number of Readings >100 µg/l
Methapyrilene	9	9	0	0
Methyl methanesulfonate	9	9	0	0
Methyl parathion	9	9	0	0
Naphthalene	9	6	3	0
Nitrobenzene	9	9	0	0
N-Nitrosodiethylamine	9	9	0	0
N-Nitrosodimethylamine	9	9	0	0
N-Nitrosodi-n-butylamine	9	9	0	0
N-Nitroso-Di-n-propylamine	9	9	0	0
N-nitrosodiphenylamine	9	9	0	0
N-Nitrosomethylethylamine	9	9	0	0
N-Nitrosopiperidine	9	9	0	0
N-Nitrosopyrrolidine	9	9	0	0
o-Toluidine	9	7	2	0
Parathion	9	9	0	0
p-Dimethylaminoazobenzene	9	9	0	0
Pentachlorobenzene	9	9	0	0
Pentachloronitrobenzene	9	9	0	0
Pentachlorophenol	9	9	0	0
Phenacetin	9	9	0	0
Phenanthrene	9	9	0	0
Phenol	9	7	2	0
Phorate	9	9	0	0
p-Phenylenediamine	9	9	0	0
Pronamide	9	9	0	0
Pyrene	9	9	0	0
Safrole	9	9	0	0
Sym-Trinitrobenzene	9	9	0	0
Thionazin	9	9	0	0
Total	**1026**	**1006**	**14**	**6**

Samples were analyzed using EPA Method 8270

TABLE 5-22. SEMI-VOLATILE ORGANIC COMPOUNDS (SVOCS) IN LEACHATE FLB 5.2B, JUNE 1, 2001 THROUGH DECEMBER 16, 2002

SVOC Compounds	Number of Readings	Number of Non-Detects (ND)	Number of Readings 1.0-100 µg/l	Number of Readings >100 µg/l
0,0,0-Triethylphosphorothioate	8	8	0	0
1,2,4,5-Tetrachlorobenzene	8	8	0	0
1,2,4-Trichlorobenzene	8	8	0	0
1,2-Dichlorobenzene	8	8	0	0
1,3-Dichlorobenzene	8	8	0	0
1,4-Dichlorobenzene	8	6	2	0
1,4-Dioxane	8	2	6	0
1,4-Naphthoquinone	8	8	0	0
1-Naphthylamine	8	8	0	0
2,2'-Oxybis(1-Chloropropane)	8	8	0	0

SVOC Compounds	Number of Readings	Number of Non-Detects (ND)	Number of Readings 1.0-100 µg/l	Number of Readings >100 µg/l
2,3,4,6-Tetrachlorophenol	8	8	0	0
2,4,5-Trichlorophenol	8	8	0	0
2,4,6-Trichlorophenol	8	8	0	0
2,4-Dichlorophenol	8	8	0	0
2,4-Dimethylphenol	8	8	0	0
2,4-Dinitrophenol	8	8	0	0
2,4-Dinitrotoluene	8	8	0	0
2,6-Dichlorophenol	8	8	0	0
2,6-Dinitrotoluene	8	8	0	0
2-Acetylaminofluorene	8	8	0	0
2-Chloronaphthalene	8	8	0	0
2-Chlorophenol	8	8	0	0
2-Methylnaphthalene	8	8	0	0
2-Naphthylamine	8	8	0	0
2-Nitroaniline	8	8	0	0
2-Nitrophenol	8	8	0	0
2-sec-Butyl-4,6-dinitrophenol	8	8	0	0
3,3'-Dichlorobenzidine	8	8	0	0
3,3'-Dimethylbenzidine	8	8	0	0
3-Methylcholanthrene	8	8	0	0
3-Nitroaniline	8	8	0	0
4-Aminobiphenyl	8	8	0	0
4-Bromophenyl phenyl ether	8	8	0	0
4-Chloroaniline	8	8	0	0
4-Chlorophenyl phenyl ether	8	8	0	0
4-Nitroaniline	8	8	0	0
4-Nitrophenol	8	8	0	0
5-Nitro-o-toluidine	8	8	0	0
7,12-Dimethylbenz(a)anthracene	8	8	0	0
Acenaphthene	8	8	0	0
Acenaphthylene	8	8	0	0
Acetophenone	8	8	0	0
Anthracene	8	8	0	0
Benzo(a)anthracene	8	8	0	0
Benzo(a)pyrene	8	8	0	0
Benzo(b)fluoranthene	8	8	0	0
Benzo(ghi)perylene	8	8	0	0
Benzo(k)fluoranthene	8	8	0	0
Benzyl alcohol	8	8	0	0
Bis(2-chloroethoxy) methane	8	8	0	0
Bis(2-chloroethyl) ether	8	8	0	0
Bis(2-ethylhexyl) phthalate	8	7	1	0
Butyl benzyl phthalate	8	8	0	0
Chlorobenzilate	8	8	0	0
Chrysene	8	8	0	0
Cresol, 4,6-Dinitro-O-	8	8	0	0
Cresol, m-	8	5	2	1
Cresol, o-	8	8	0	0
Cresol, p-	8	5	2	1

SVOC Compounds	Number of Readings	Number of Non-Detects (ND)	Number of Readings 1.0-100 µg/l	Number of Readings >100 µg/l
Cresol, p-Chloro-m-	8	8	0	0
Diallate	8	8	0	0
Dibenzo(a,h)anthracene	8	8	0	0
Dibenzofuran	8	8	0	0
Diethyl phthalate	8	8	0	0
Dimethoate	8	8	0	0
Dimethyl phthalate	8	8	0	0
Di-n-butyl phthalate	8	8	0	0
Di-n-octyl phthalate	8	8	0	0
Diphenylamine	8	8	0	0
Disulfoton	8	8	0	0
Ethyl methane sulfonate	8	8	0	0
Famphur	8	8	0	0
Fluoranthene	8	8	0	0
Fluorene	8	8	0	0
Hexachlorobenzene	8	8	0	0
Hexachlorobutadiene	8	8	0	0
Hexachlorocyclopentadiene	8	8	0	0
Hexachloroethane	8	8	0	0
Hexachloropropene	8	8	0	0
Indeno(1,2,3-cd)pyrene	8	8	0	0
Isodrin	8	8	0	0
Isophorone	8	8	0	0
Isosafrole	8	8	0	0
Kepone	8	8	0	0
m-Dinitrobenzene	8	8	0	0
Methapyrilene	8	8	0	0
Methyl methanesulfonate	8	8	0	0
Methyl parathion	8	8	0	0
Naphthalene	8	8	0	0
Nitrobenzene	8	8	0	0
N-Nitrosodiethylamine	8	8	0	0
N-Nitrosodimethylamine	8	8	0	0
N-Nitrosodi-n-butylamine	8	8	0	0
N-Nitroso-Di-n-propylamine	8	8	0	0
N-nitrosodiphenylamine	8	8	0	0
N-Nitrosomethylethylamine	8	8	0	0
N-Nitrosopiperidine	8	8	0	0
N-Nitrosopyrrolidine	8	8	0	0
o-Toluidine	8	5	3	0
Parathion	8	8	0	0
p-Dimethylaminoazobenzene	8	8	0	0
Pentachlorobenzene	8	8	0	0
Pentachloronitrobenzene	8	8	0	0
Pentachlorophenol	8	8	0	0
Phenacetin	8	8	0	0
Phenanthrene	8	8	0	0
Phenol	8	7	1	0
Phorate	8	8	0	0

SVOC Compounds	Number of Readings	Number of Non-Detects (ND)	Number of Readings 1.0-100 µg/l	Number of Readings >100 µg/l
p-Phenylenediamine	8	8	0	0
Pronamide	8	8	0	0
Pyrene	8	8	0	0
Safrole	8	8	0	0
Sym-Trinitrobenzene	8	8	0	0
Thionazin	8	8	0	0
Total	**912**	**893**	**17**	**2**

Samples were analyzed using EPA Method 8270

TABLE 5-23. SEMI-VOLATILE ORGANIC COMPOUNDS (SVOCS) IN LEACHATE AALB 7.4A, MARCH 20, 2002 THROUGH DECEMBER 16, 2002

SVOC Compounds	Number of Readings	Number of Non-Detects (ND)	Number of Readings 1.0-100 µg/l	Number of Readings >100 µg/l
0,0,0-Triethylphosphorothioate	4	4	0	0
1,2,4,5-Tetrachlorobenzene	4	4	0	0
1,2,4-Trichlorobenzene	4	4	0	0
1,2-Dichlorobenzene	4	4	0	0
1,3-Dichlorobenzene	4	4	0	0
1,4-Dichlorobenzene	4	4	0	0
1,4-Dioxane	4	4	0	0
1,4-Naphthoquinone	4	4	0	0
1-Naphthylamine	4	4	0	0
2,2'-Oxybis(1-Chloropropane)	4	4	0	0
2,3,4,6-Tetrachlorophenol	4	4	0	0
2,4,5-Trichlorophenol	4	4	0	0
2,4,6-Trichlorophenol	4	4	0	0
2,4-Dichlorophenol	4	4	0	0
2,4-Dimethylphenol	4	4	0	0
2,4-Dinitrophenol	4	4	0	0
2,4-Dinitrotoluene	4	4	0	0
2,6-Dichlorophenol	4	4	0	0
2,6-Dinitrotoluene	4	4	0	0
2-Acetylaminofluorene	4	4	0	0
2-Chloronaphthalene	4	4	0	0
2-Chlorophenol	4	4	0	0
2-Methylnaphthalene	4	4	0	0
2-Naphthylamine	4	4	0	0
2-Nitroaniline	4	4	0	0
2-Nitrophenol	4	4	0	0
2-sec-Butyl-4,6-dinitrophenol	4	4	0	0
3,3'-Dichlorobenzidine	4	4	0	0
3,3'-Dimethylbenzidine	4	4	0	0
3-Methylcholanthrene	4	4	0	0
3-Nitroaniline	4	4	0	0
4-Aminobiphenyl	4	4	0	0

SVOC Compounds	Number of Readings	Number of Non-Detects (ND)	Number of Readings 1.0-100 µg/l	Number of Readings >100 µg/l
4-Bromophenyl phenyl ether	4	4	0	0
4-Chloroaniline	4	4	0	0
4-Chlorophenyl phenyl ether	4	4	0	0
4-Nitroaniline	4	4	0	0
4-Nitrophenol	4	4	0	0
5-Nitro-o-toluidine	4	4	0	0
7,12-Dimethylbenz(a)anthracene	4	4	0	0
Acenaphthene	4	4	0	0
Acenaphthylene	4	4	0	0
Acetophenone	4	4	0	0
Anthracene	4	4	0	0
Benzo(a)anthracene	4	4	0	0
Benzo(a)pyrene	4	4	0	0
Benzo(b)fluoranthene	4	4	0	0
Benzo(ghi)perylene	4	4	0	0
Benzo(k)fluoranthene	4	4	0	0
Benzyl alcohol	4	4	0	0
Bis(2-chloroethoxy) methane	4	4	0	0
Bis(2-chloroethyl) ether	4	4	0	0
Bis(2-ethylhexyl) phthalate	4	3	1	0
Butyl benzyl phthalate	4	4	0	0
Chlorobenzilate	4	4	0	0
Chrysene	4	4	0	0
Cresol, 4,6-Dinitro-O-	4	4	0	0
Cresol, m-	4	1	0	3
Cresol, o-	4	2	2	0
Cresol, p-	4	0	1	3
Cresol, p-Chloro-m-	4	4	0	0
Diallate	4	4	0	0
Dibenzo(a,h)anthracene	4	4	0	0
Dibenzofuran	4	4	0	0
Diethyl phthalate	4	4	0	0
Dimethoate	4	4	0	0
Dimethyl phthalate	4	4	0	0
Di-n-butyl phthalate	4	4	0	0
Di-n-octyl phthalate	4	4	0	0
Diphenylamine	4	4	0	0
Disulfoton	4	4	0	0
Ethyl methane sulfonate	4	4	0	0
Famphur	4	4	0	0
Fluoranthene	4	4	0	0
Fluorene	4	4	0	0
Hexachlorobenzene	4	4	0	0
Hexachlorobutadiene	4	4	0	0
Hexachlorocyclopentadiene	4	4	0	0
Hexachloroethane	4	4	0	0
Hexachloropropene	4	4	0	0
Indeno(1,2,3-cd)pyrene	4	4	0	0
Isodrin	4	4	0	0

SVOC Compounds	Number of Readings	Number of Non-Detects (ND)	Number of Readings 1.0-100 µg/l	Number of Readings >100 µg/l
Isophorone	4	4	0	0
Isosafrole	4	4	0	0
Kepone	4	4	0	0
m-Dinitrobenzene	4	4	0	0
Methapyrilene	4	4	0	0
Methyl methanesulfonate	4	4	0	0
Methyl parathion	4	4	0	0
Naphthalene	4	4	0	0
Nitrobenzene	4	4	0	0
N-Nitrosodiethylamine	4	4	0	0
N-Nitrosodimethylamine	4	4	0	0
N-Nitrosodi-n-butylamine	4	4	0	0
N-Nitroso-Di-n-propylamine	4	4	0	0
N-nitrosodiphenylamine	4	4	0	0
N-Nitrosomethylethylamine	4	4	0	0
N-Nitrosopiperidine	4	4	0	0
N-Nitrosopyrrolidine	4	4	0	0
o-Toluidine	4	3	1	0
Parathion	4	4	0	0
p-Dimethylaminoazobenzene	4	4	0	0
Pentachlorobenzene	4	4	0	0
Pentachloronitrobenzene	4	4	0	0
Pentachlorophenol	4	4	0	0
Phenacetin	4	4	0	0
Phenanthrene	4	4	0	0
Phenol	4	2	2	0
Phorate	4	4	0	0
p-Phenylenediamine	4	4	0	0
Pronamide	4	4	0	0
Pyrene	4	4	0	0
Safrole	4	4	0	0
Sym-Trinitrobenzene	4	4	0	0
Thionazin	4	4	0	0
Total	**456**	**443**	**7**	**6**

Samples were analyzed using EPA Method 8270

TABLE 5-24. SEMI-VOLATILE ORGANIC COMPOUNDS (SVOCS) IN LEACHATE: AALB 7.4B, MARCH 20, 2002 THROUGH DECEMBER 16, 2002

SVOC Compounds	Number of Readings	Number of Non-Detects (ND)	Number of Readings 1.0-100 µg/l	Number of Readings >100 µg/l
0,0,0-Triethylphosphorothioate	4	4	0	0
1,2,4,5-Tetrachlorobenzene	4	4	0	0
1,2,4-Trichlorobenzene	4	4	0	0
1,2-Dichlorobenzene	4	4	0	0
1,3-Dichlorobenzene	4	4	0	0
1,4-Dichlorobenzene	4	4	0	0

SVOC Compounds	Number of Readings	Number of Non-Detects (ND)	Number of Readings 1.0-100 µg/l	Number of Readings >100 µg/l
1,4-Dioxane	4	4	0	0
1,4-Naphthoquinone	4	4	0	0
1-Naphthylamine	4	4	0	0
2,2'-Oxybis(1-Chloropropane)	4	4	0	0
2,3,4,6-Tetrachlorophenol	4	4	0	0
2,4,5-Trichlorophenol	4	4	0	0
2,4,6-Trichlorophenol	4	4	0	0
2,4-Dichlorophenol	4	4	0	0
2,4-Dimethylphenol	4	4	0	0
2,4-Dinitrophenol	4	4	0	0
2,4-Dinitrotoluene	4	4	0	0
2,6-Dichlorophenol	4	4	0	0
2,6-Dinitrotoluene	4	4	0	0
2-Acetylaminofluorene	4	4	0	0
2-Chloronaphthalene	4	4	0	0
2-Chlorophenol	4	4	0	0
2-Methylnaphthalene	4	4	0	0
2-Naphthylamine	4	4	0	0
2-Nitroaniline	4	4	0	0
2-Nitrophenol	4	4	0	0
2-sec-Butyl-4,6-dinitrophenol	4	4	0	0
3,3'-Dichlorobenzidine	4	4	0	0
3,3'-Dimethylbenzidine	4	4	0	0
3-Methylcholanthrene	4	4	0	0
3-Nitroaniline	4	4	0	0
4-Aminobiphenyl	4	4	0	0
4-Bromophenyl phenyl ether	4	4	0	0
4-Chloroaniline	4	4	0	0
4-Chlorophenyl phenyl ether	4	4	0	0
4-Nitroaniline	4	4	0	0
4-Nitrophenol	4	4	0	0
5-Nitro-o-toluidine	4	4	0	0
7,12-Dimethylbenz(a)anthracene	4	4	0	0
Acenaphthene	4	4	0	0
Acenaphthylene	4	4	0	0
Acetophenone	4	4	0	0
Anthracene	4	4	0	0
Benzo(a)anthracene	4	4	0	0
Benzo(a)pyrene	4	4	0	0
Benzo(b)fluoranthene	4	4	0	0
Benzo(ghi)perylene	4	4	0	0
Benzo(k)fluoranthene	4	4	0	0
Benzyl alcohol	4	4	0	0
Bis(2-chloroethoxy) methane	4	4	0	0
Bis(2-chloroethyl) ether	4	4	0	0
Bis(2-ethylhexyl) phthalate	4	3	1	0
Butyl benzyl phthalate	4	4	0	0
Chlorobenzilate	4	4	0	0
Chrysene	4	4	0	0

SVOC Compounds	Number of Readings	Number of Non-Detects (ND)	Number of Readings 1.0-100 µg/l	Number of Readings >100 µg/l
Cresol, 4,6-Dinitro-O-	4	4	0	0
Cresol, m-	4	0	0	4
Cresol, o-	4	2	0	2
Cresol, p-	4	0	0	4
Cresol, p-Chloro-m-	4	4	0	0
Diallate	4	4	0	0
Dibenzo(a,h)anthracene	4	4	0	0
Dibenzofuran	4	3	1	0
Diethyl phthalate	4	4	0	0
Dimethoate	4	4	0	0
Dimethyl phthalate	4	4	0	0
Di-n-butyl phthalate	4	4	0	0
Di-n-octyl phthalate	4	4	0	0
Diphenylamine	4	4	0	0
Disulfoton	4	4	0	0
Ethyl methane sulfonate	4	4	0	0
Famphur	4	4	0	0
Fluoranthene	4	4	0	0
Fluorene	4	4	0	0
Hexachlorobenzene	4	4	0	0
Hexachlorobutadiene	4	4	0	0
Hexachlorocyclopentadiene	4	4	0	0
Hexachloroethane	4	4	0	0
Hexachloropropene	4	4	0	0
Indeno(1,2,3-cd)pyrene	4	4	0	0
Isodrin	4	4	0	0
Isophorone	4	4	0	0
Isosafrole	4	4	0	0
Kepone	4	4	0	0
m-Dinitrobenzene	4	4	0	0
Methapyrilene	4	4	0	0
Methyl methanesulfonate	4	4	0	0
Methyl parathion	4	4	0	0
Naphthalene	4	3	0	1
Nitrobenzene	4	4	0	0
N-Nitrosodiethylamine	4	4	0	0
N-Nitrosodimethylamine	4	4	0	0
N-Nitrosodi-n-butylamine	4	4	0	0
N-Nitroso-Di-n-propylamine	4	4	0	0
N-nitrosodiphenylamine	4	4	0	0
N-Nitrosomethylethylamine	4	4	0	0
N-Nitrosopiperidine	4	4	0	0
N-Nitrosopyrrolidine	4	4	0	0
o-Toluidine	4	4	0	0
Parathion	4	4	0	0
p-Dimethylaminoazobenzene	4	4	0	0
Pentachlorobenzene	4	4	0	0
Pentachloronitrobenzene	4	4	0	0
Pentachlorophenol	4	4	0	0

SVOC Compounds	Number of Readings	Number of Non-Detects (ND)	Number of Readings 1.0-100 µg/l	Number of Readings >100 µg/l
Phenacetin	4	4	0	0
Phenanthrene	4	4	0	0
Phenol	4	1	1	2
Phorate	4	4	0	0
p-Phenylenediamine	4	4	0	0
Pronamide	4	4	0	0
Pyrene	4	4	0	0
Safrole	4	4	0	0
Sym-Trinitrobenzene	4	4	0	0
Thionazin	4	4	0	0
Total	**456**	**440**	**3**	**13**

Samples were analyzed using EPA Method 8270

Summary of RCRA Hazardous Metals in Leachate

Sampling for RCRA hazardous metals, which are presented in Tables 5-25 through 5-27, were collected for all three of the study units. Sampling began for the Control and FLB units in June 2001, while sampling for the AALB began in March 2002. Samples, which are collected on a quarterly basis, are analyzed using EPA Method 6010 (B) except for mercury, which is analyzed using EPA Method 7470 (B).

For all three of the study units, potassium was detected at levels greater than 1.0 mg/l. Other common metals detected are arsenic, barium, cadmium, chromium, and lead. Ninety percent of these detected constituents were detected in ranges less than 1.0 mg/l.

TABLE 5-25. RCRA HAZARDOUS METALS IN LEACHATE CONTROL 7.3A AND 7.3B, JUNE 26, 2001 THROUGH DECEMBER 16, 2002

Metals	Number of Readings	Number of Non-Detects (ND)	Number of Readings Between 0.001 - 1.0 mg/l	Number of Readings >1.0 mg/l
Arsenic, Total	14	14	0	0
Barium, Total	14	0	14	0
Cadmium, Total	14	14	0	0
Chromium, Total	14	2	12	0
Lead, Total	14	11	3	0
Potassium, Total	14	0	0	14
Selenium, Total	14	14	0	0
Silver, Total	14	14	0	0
Mercury, Total	14	14	0	0
Total	**126**	**83**	**29**	**14**

Samples were analyzed using EPA Method 6010 (B) except for mercury, which was analyzed using EPA Method 7470(B)

TABLE 5-26. RCRA HAZARDOUS METALS IN LEACHATE FLB 5.1A AND 5.2B, JUNE 1, 2001 THROUGH DECEMBER 16, 2002

Metals	Number of Readings	Number of Non-Detects (ND)	Number of Readings Between 0.001 - 1.0 mg/l	Number of Readings >1.0 mg/l
Arsenic, Total	16	0	16	0
Barium, Total	16	0	11	5
Cadmium, Total	16	14	2	0
Chromium, Total	16	0	16	0
Lead, Total	16	9	7	0
Potassium, Total	16	0	0	16
Selenium, Total	16	16	0	0
Silver, Total	16	16	0	0
Mercury, Total	16	16	0	0
Total	**144**	**71**	**52**	**21**

Samples were analyzed using EPA Method 6010 (B) except for mercury, which was analyzed using EPA Method 7470(B)

TABLE 5-27. RCRA HAZARDOUS METALS IN LEACHATE AALB 7.4A AND 7.4B, MARCH 20, 2002 THROUGH DECEMBER 16, 2002

Metals	Number of Readings	Number of Non-Detects (ND)	Number of Readings Between 0.001 - 1.0 mg/l	Number of Readings >1.0 mg/l
Arsenic, Total	8	0	8	0
Barium, Total	8	0	8	0
Cadmium, Total	8	2	6	0
Chromium, Total	8	0	8	0
Lead, Total	8	0	8	0
Potassium, Total	8	0	0	8
Selenium, Total	8	8	0	0
Silver, Total	8	8	0	0
Mercury, Total	8	8	0	0
Total	**72**	**24**	**40**	**8**

Samples were analyzed using EPA Method 6010 (B) except for mercury, which was analyzed using EPA Method 7470(B)

MUNICIPAL SOLID WASTE (MSW) CHARACTERISTICS

Municipal solid waste (MSW) parameters were measured both on-site using permanent monitoring probes installed at various locations in each cell on a daily basis, and by sample collection of a minimum of 30 boring samples per cell for off-site lab analysis on an annual basis. The results documented in this report apply to the Control Unit (7.3 A and B), the FLB (Unit 5.1 and 5.2) and the AALB (Unit 7.4 A and B).

Summary of Organic Solids in MSW

The organic solids have been measured for all cells under investigation. Two sampling events have occurred for each cell, the first is represented by the shaded bar and the second by the white bar in Figure 5-39. The first sampling event is referred to in the Figures as the baseline 2000/2001, and occurred at different times for the different cells. The baseline-sampling event for the FLB and Control Units occurred in June 2000. However, no waste was in place in either AALB 7.4 A or 7.4B cell, these were sampled in the summer and fall of 2001, respectively, after waste placement had commenced. The second sampling event took place in October 2002 for all cells.

Each sampling event required a minimum of 30 MSW samples to be taken per cell. Note that the two cells of the FLB (5.1 and 5.2) are each made up of two sub-cells, the results from these are combined in the Figure.

The top surface of each bar in Figure 5-39 corresponds to the mean value of all samples taken in that sampling event. The standard deviation from that mean is also displayed. The data has been further summarized in the table below in Table 5-28.

TABLE 5-28. SUMMARY OF ORGANIC SOLIDS IN MSW

DATE	AVERAGE	STD. DEVIATION
FLB 5.1 (two sub-cells A and B)		
2000/2001	43.57	15.81
Oct 2002	33.06	10.43
%Difference between sampling events = 24% decrease		
FLB 5.2 (two sub-cells A and B)		
2000/2001	36.38	12.75
Oct 2002	32.90	10.40
Difference between sampling events = 10% decrease		
Control 7.3A		
2000/2001	67.19	16.35
Oct 2002	41.67	11.61
Difference between sampling events = 38% decrease		
Control 7.3B		
2000/2001	63.54	16.84
Oct 2002	45.96	15.82
Difference between sampling events = 28% decrease		
AALB 7.4A		
2000/2001	62.46	12.07
Oct 2002	41.94	5.96

DATE	AVERAGE	STD. DEVIATION
Difference between sampling events = 33% decrease		
AALB 7.4B		
2000/2001	82.55	4.19
Oct 2002	37.78	8.84
Difference between sampling events = 55% decrease		

In all cells, values for percent volatile solids show a decrease between 2000/2001 and October 2002.

Summary of Biochemical Methane Production (BMP) in MSW

A summary Biochemical Methane Production (BMP) is displayed graphically in Figure 5-40. The Figure is expressed in a similar form to Figure 5-39, and the interpretation of this representation provided above for volatile solids is also applicable to this. It represents the same two sampling events and is an average of the same samples.

The data have been further summarized below in Table 5-29.

TABLE 5-29. SUMMARY OF BMP IN MSW

DATE	AVERAGE	STD. DEVIATION
FLB 5.1 (two sub-cells A and B)		
2000/2001	41.81	33.49
Oct 2002	27.64	20.57
%Difference between sampling events = 34% decrease*		
FLB 5.2 (two sub-cells A and B)		
2000/2001	29.95	19.66
Oct 2002	24.28	15.77
Difference between sampling events = 19% decrease*		
Control 7.3A		
2000/2001	102.38	37.35
Oct 2002	37.22	22.89
Difference between sampling events = 64% decrease		
Control 7.3B		
2000/2001	97.15	39.53
Oct 2002	40.40	19.73
Difference between sampling events = 58% decrease		
AALB 7.4A		
2000/2001	57.68	18.49
Oct 2002	28.77	14.17
Difference between sampling events = 50% decrease		
AALB 7.4B		
2000/2001	84.22	22.32
Oct 2002	26.70	20.70
Difference between sampling events = 68% decrease		

Overall, the BMP shows a decrease between 2000/2001 and October 2002 in all cells. *The smallest decrease is seen in the FLB cells where the standard deviation is significantly greater than the apparent difference, hence therefore no detectable difference can be claimed.

Figure 5-39. Solid Waste Organic Solids Content Summary for FLB, Control and AALB Cells

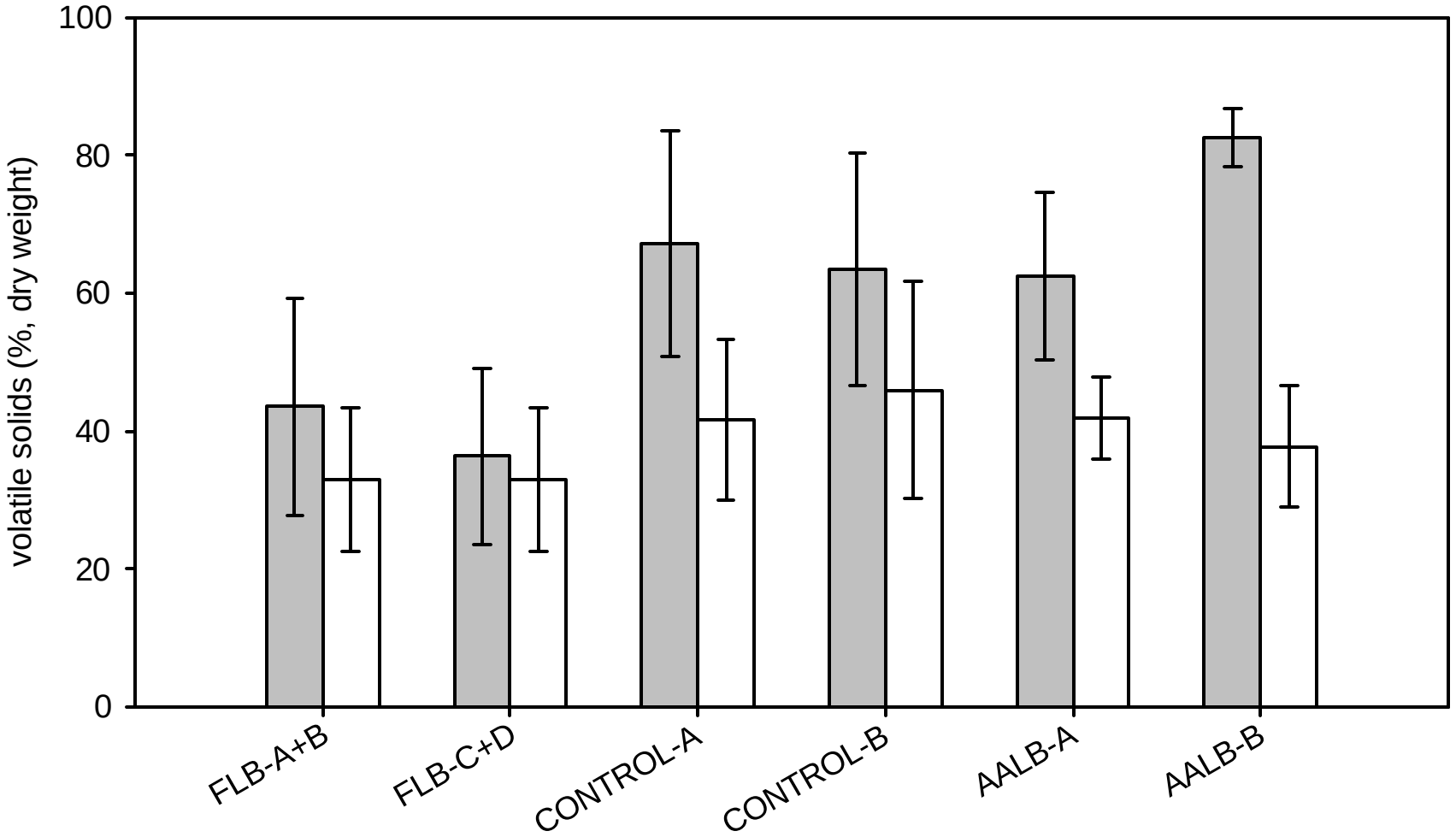
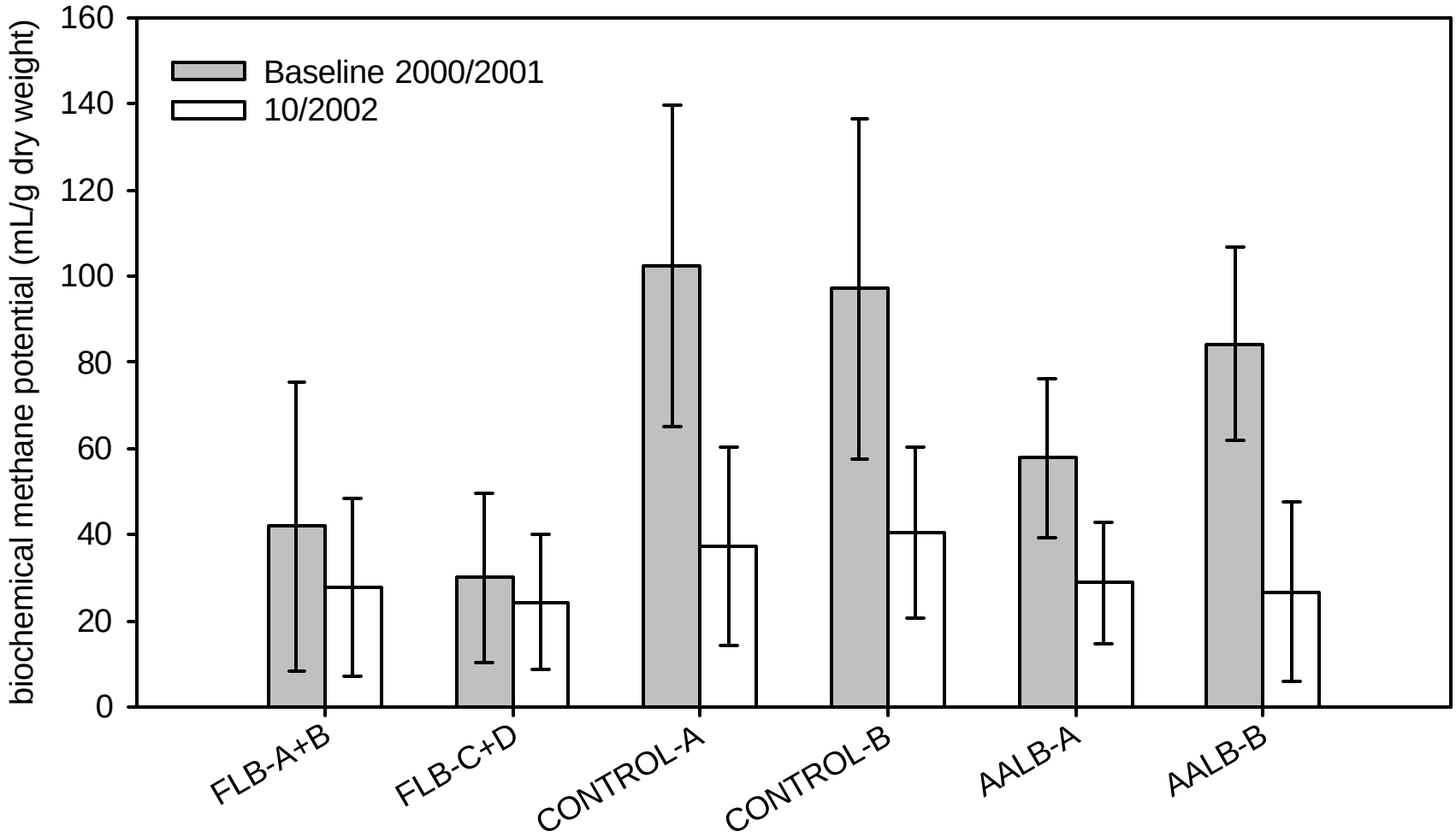


Figure 5-40. Solid Waste BMP Summary for FLB, Control and AALB Cells



Summary of (Cellulose + Hemicellulose)/Lignin Ratio of MSW

A summary (Cellulose + Hemicellulose)/Lignin Ratio is displayed graphically in Figure 5-41. The Figure is expressed in a similar form to Figure 5-39, and the interpretation of this representation provided above for volatile solids is also applicable to this. It represents the same two sampling events and is an average of the same samples.

The data have been further summarized in the table below In Table 5-30.

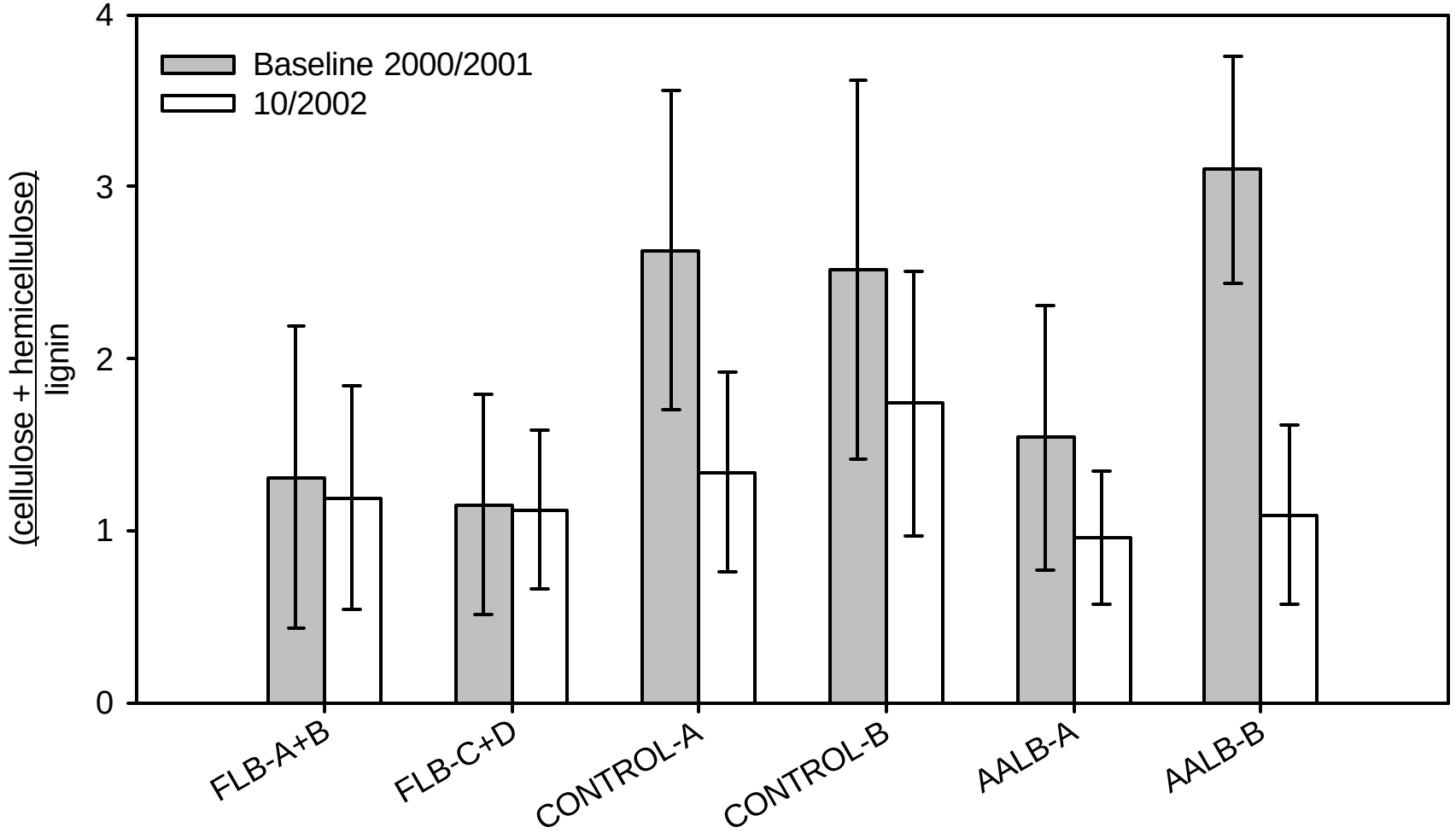
TABLE 5-30. SUMMARY OF (CELLULOSE + HEMICELLULOSE)/ LIGNIN RATIO OF MSW

DATE	AVERAGE	STD. DEVIATION
FLB 5.1 (two sub-cells A and B)		
2000/2001	1.31	.0.88
Oct 2002	1.19	0.65
%Difference between sampling events = 9% decrease		
FLB 5.2 (two sub-cells A and B)		
2000/2001	1.15	0.64
Oct 2002	1.12	0.46
Difference between sampling events = 3% decrease		
Control 7.3A		
2000/2001	2.36	0.93
Oct 2002	1.34	0.58
Difference between sampling events = 43% decrease		
Control 7.3B		
2000/2001	2.52	1.10
Oct 2002	1.74	0.77
Difference between sampling events = 31% decrease		
AALB 7.4A		
2000/2001	1.54	0.77
Oct 2002	0.96	0.39
Difference between sampling events = 38% decrease		
AALB 7.4B		
2000/2001	3.10	0.66
Oct 2002	1.09	0.52
Difference between sampling events = 65% decrease		

Overall, a decrease in the (Cellulose + Hemicellulose)/Lignin ratio is seen in the Control and AALB cells. The FLB values have remained essentially constant between 2000/2001 and October 2002, with the standard deviation in the measurements significantly outweighing any apparent change.

This ratio is affected by the rate of decay of the hemicellulose and cellulose versus that of lignin. These plant polymers make up a large percentage of the biodegradable fraction of landfill waste and hence provide indicators of the waste degradation. Cellulose and hemicellulose are readily biodegradable in the landfill environment, whereas lignin has a much slower rate of decay. Monitoring of this ratio can provide a measure of waste degradation independent of the quantity of different materials present in the landfill, allowing comparisons over time and across samples.

Figure 5-41. Solid Waste (Cellulose + Hemicellulose)/Lignin Ratio Summary for FLB, Control and AALB Cells



Summary of Lignin Content of MSW

A summary of lignin content is displayed graphically in Figure 5-42. The Figure is expressed in a similar form to Figure 5-39, and the interpretation of this representation provided above for volatile solids is also applicable to this. It represents the same two sampling events and is an average of the same samples.

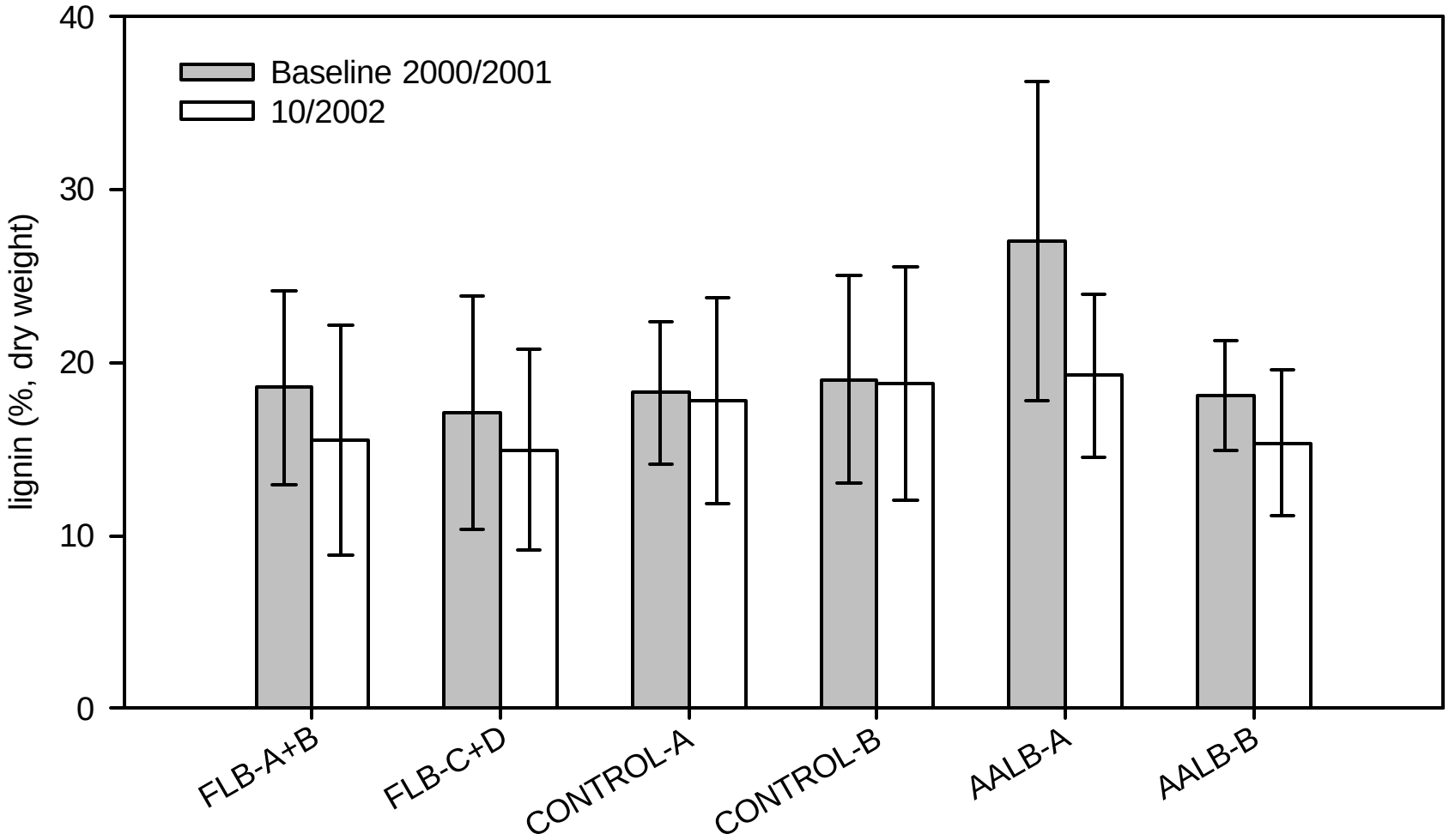
The data have been further summarized below in Table 5-31.

TABLE 5-31. SUMMARY OF LIGNIN CONTENT OF MSW

DATE	AVERAGE	STD. DEVIATION
FLB 5.1 (two sub-cells A and B)		
2000/2001	18.56	5.64
Oct 2002	15.50	6.65
%Difference between sampling events = 16% decrease		
FLB 5.2 (two sub-cells B and C)		
2000/2001	17.11	6.79
Oct 2002	14.95	5.80
Difference between sampling events = 13% decrease		
Control 7.3A		
2000/2001	18.24	4.08
Oct 2002	17.83	5.94
Difference between sampling events = 2% decrease		
Control 7.3B		
2000/2001	19.01	5.99
Oct 2002	18.79	6.72
Difference between sampling events = 1% decrease		
AALB 7.4A		
2000/2001	27.00	9.23
Oct 2002	19.24	4.69
Difference between sampling events = 29% decrease		
AALB 7.4B		
2000/2001	18.12	3.15
Oct 2002	15.35	4.21
Difference between sampling events = 15% decrease		

Overall, a decrease is seen in the lignin content in the treated cells FLB and AALB, while the lignin content in the control cells has remained constant over the period. However, in all cases the standard deviation is significantly greater than the observed differences.

Figure 5-42. Solid Waste Lignin Content Summary for FLB, Control and AALB Cells



Summary of Hemicellulose Content of MSW

A summary of the hemicellulose content is displayed graphically in Figure 5-43. The Figure is expressed in a similar form to Figure 5-39, and the interpretation of this representation provided above for volatile solids is also applicable to this. It represents the same two sampling events and is an average of the same samples.

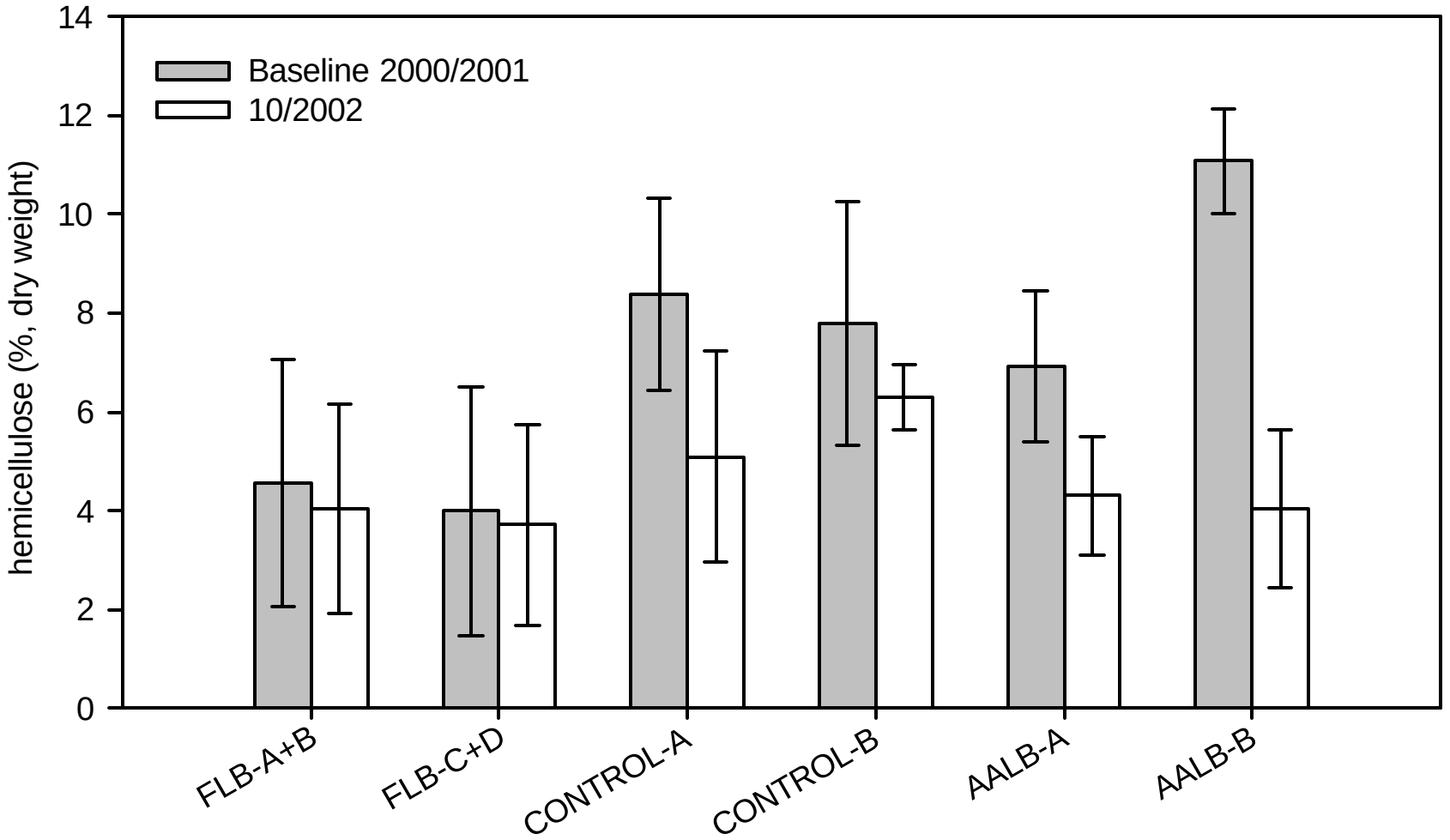
The data have been further summarized below in Table 5-32.

TABLE 5-32. SUMMARY OF HEMICELLULOSE IN MSW

DATE	AVERAGE	STD. DEVIATION
FLB 5.1 (two sub-cells A and B)		
2000/2001	4.56	2.51
Oct 2002	4.04	2.13
%Difference between sampling events = 11% decrease		
FLB 5.2 (two sub-cells A and B)		
2000/2001	4.00	2.52
Oct 2002	3.72	2.03
Difference between sampling events = 7% decrease		
Control 7.3A		
2000/2001	8.38	1.96
Oct 2002	5.10	2.15
Difference between sampling events = 39% decrease		
Control 7.3B		
2000/2001	7.80	2.47
Oct 2002	6.28	0.66
Difference between sampling events = 19% decrease		
AALB 7.4A		
2000/2001	6.92	1.52
Oct 2002	4.31	1.20
Difference between sampling events = 38% decrease		
AALB 7.4B		
2000/2001	11.09	1.06
Oct 2002	4.03	1.60
Difference between sampling events = 64% decrease		

Overall, a decrease in the hemicellulose content is seen for all cells over the period. The largest decrease is seen in the AALB B cell. The smallest decrease is seen in the FLB cells, where the standard deviation is significantly greater than the observed difference.

Figure 5-43. Solid Waste Hemicellulose Content Summary for FLB, Control and AALB Cells



Summary of Cellulose Content of MSW

A summary of cellulose content is displayed graphically in Figure 5-44. The Figure is expressed in a similar form to Figure 5-39, and the interpretation of this representation provided above for volatile solids is also applicable to this. It represents the same two sampling events and is an average of the same samples.

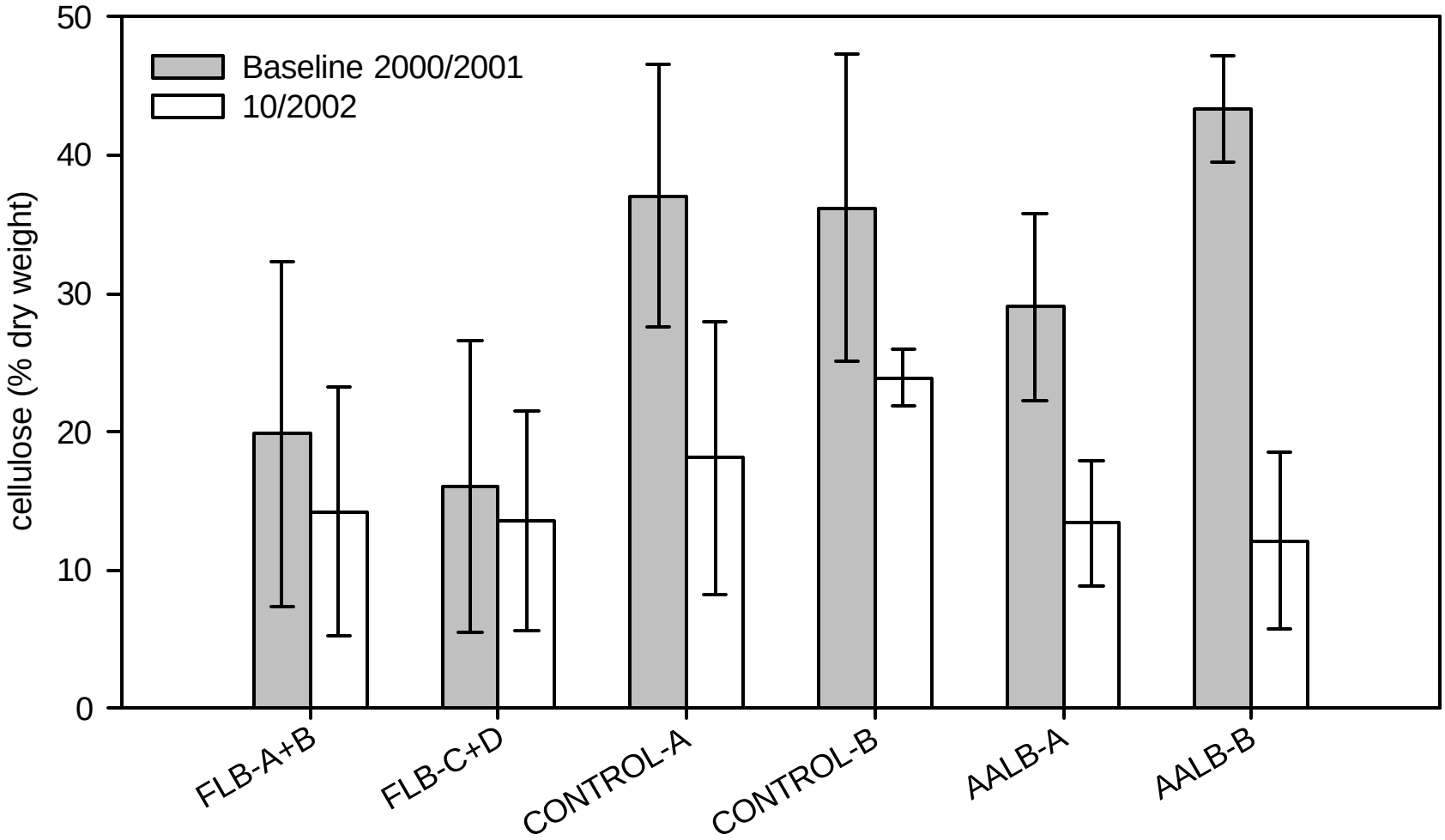
The data have been further summarized below in Table 5-33.

TABLE 5-33. SUMMARY OF CELLULOSE CONTENT OF MSW

DATE	AVERAGE	STD. DEVIATION
FLB 5.1 (two sub-cells A and B)		
2000/2001	19.84	12.48
Oct 2002	14.20	9.00
%Difference between sampling events = 28% decrease		
FLB 5.2 (two sub-cells A and B)		
2000/2001	16.02	10.52
Oct 2002	13.53	7.93
Difference between sampling events = 16% decrease		
Control 7.3A		
2000/2001	37.06	9.51
Oct 2002	18.13	9.89
Difference between sampling events = 51% decrease		
Control 7.3B		
2000/2001	36.18	11.09
Oct 2002	23.91	2.08
Difference between sampling events = 34% decrease		
AALB 7.4A		
2000/2001	29.03	6.74
Oct 2002	13.40	4.56
Difference between sampling events = 54% decrease		
AALB 7.4B		
2000/2001	43.28	3.85
Oct 2002	12.14	6.34
Difference between sampling events = 72% decrease		

Overall, a decrease in the cellulose content is seen in all cells over the period. The standard deviation associated with the FLB data is significantly greater than the difference observed. The largest decrease was seen in the AALB B cell.

Figure 5-44. Solid Waste Cellulose Content Summary for FLB, Control and AALB Cells



Summary of Moisture Content of MSW

A summary of the moisture content is displayed graphically in Figure 5-45. The Figure is expressed in a similar form to Figure 5-39, and the interpretation of this representation provided above for volatile solids is also applicable to this. It represents the same two sampling events and is an average of the same samples.

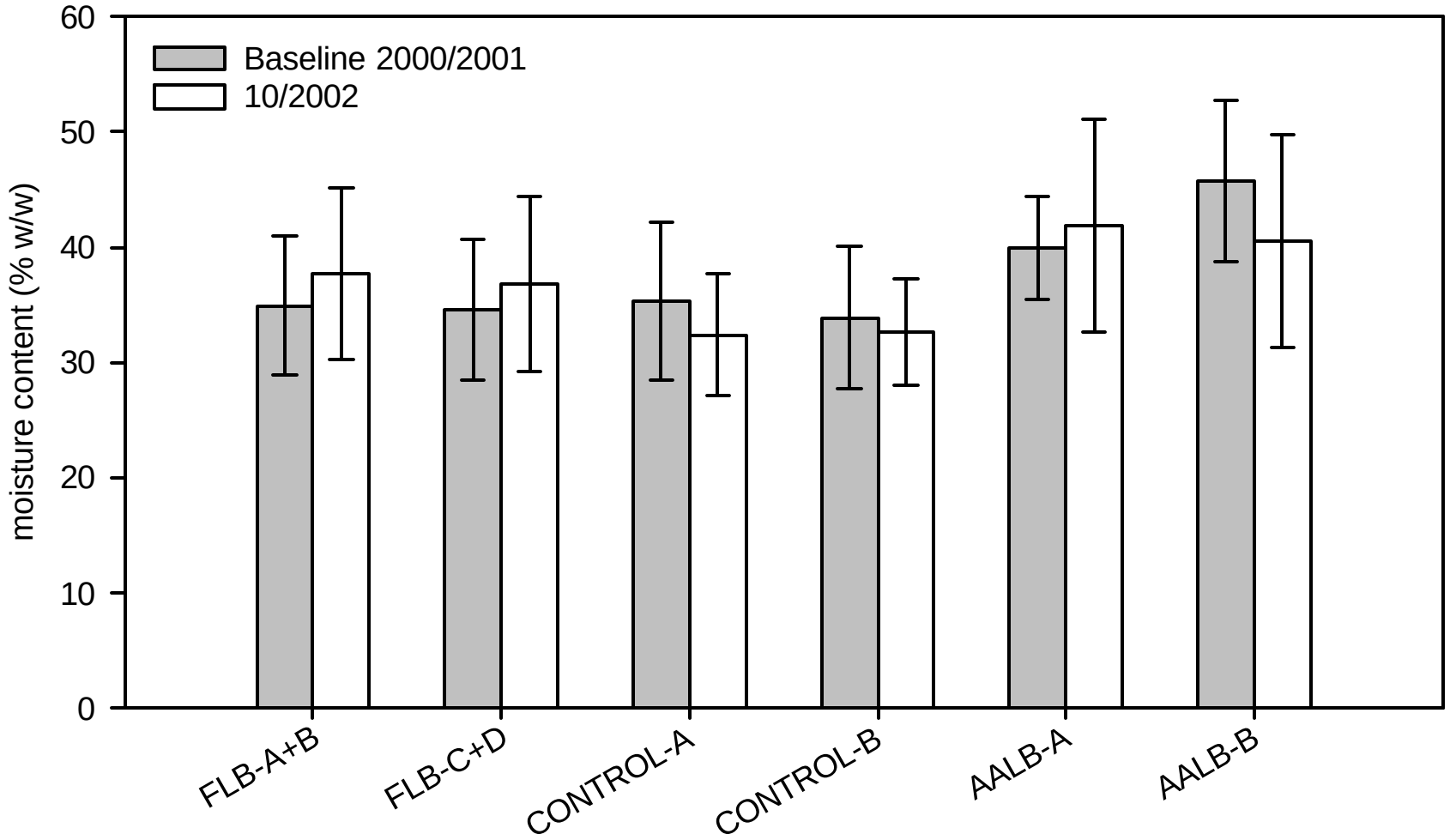
The data have been further summarized below in Table 5-34.

TABLE 5-34. SUMMARY OF MOISTURE CONTENT OF MSW

DATE	AVERAGE	STD. DEVIATION
FLB 5.1 (two sub-cells A and B)		
2000/2001	34.95	6.01
Oct 2002	37.69	7.47
%Difference between sampling events = 8% increase		
FLB 5.2 (two sub-cells A and B)		
2000/2001	34.52	6.12
Oct 2002	36.81	7.64
Difference between sampling events = 7% increase		
Control 7.3A		
2000/2001	35.34	6.81
Oct 2002	32.39	5.27
Difference between sampling events = 8% decrease		
Control 7.3B		
2000/2001	33.90	6.15
Oct 2002	32.63	4.57
Difference between sampling events = 4% decrease		
AALB 7.4A		
2000/2001	39.97	4.46
Oct 2002	41.91	9.19
Difference between sampling events = 5% increase		
AALB 7.4B		
2000/2001	45.78	7.01
Oct 2002	40.55	9.21
Difference between sampling events = 11% decrease		

Overall, the moisture content of the waste has remained consistent over the period for each cell, and is overall comparable between cells.

Figure 5-45. Solid Waste Moisture Content Summary for FLB, Control and AALB Cells



Summary of Oxidation Reduction Potential (ORP) of MSW

Oxidation-reduction potential (ORP) probes were installed in the waste in the FLB, Control and AALB cells in to assess their usefulness as qualitative indicators of the redox state of the waste during treatment (aerobic or anaerobic). A summary of the mean, maximum and minimum readings for the installed probes in the FLB, Control and AALB cells is provided in the following table.

No clear trends in the ORP measurements over time or in response to various treatments that would be expected to influence the ORP of the waste, such as aeration in the AALB, were observed for these probes. In general the readings are characterized by large fluctuations in ORP spanning a wide range of values.

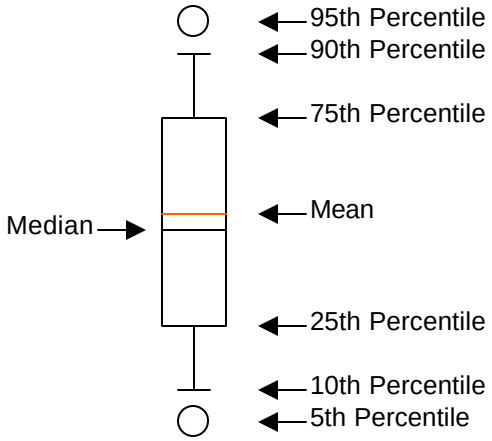
TABLE 5-35. SUMMARY OF ORP DATA FOR FLB, CONTROL AND AALB CELLS

Probe ID	IR Nomenclature	Mean (mV)	Maximum (mV)	Minimum (mV)
51A O01	FLB-A No.1	21.5929	203.0000	-88.0000
51A O02	FLB-A No.2	-336.4054	168.0000	-511.0000
51A O03	FLB-A No.3	183.2729	546.0000	-159.0000
51A O04	FLB-A No.4	285.4352	363.0000	0.0000
51B O01	FLB-B No.1	346.7713	564.0000	-270.0000
52A O01	FLB-C No. 1	10.4687	634.0000	0.0000
52B O01	FLB-D No. 1	2.1590	132.0000	0.0000
52B O02	FLB-D No. 2	160.9255	806.0000	-518.0000
52B O03	FLB-D No. 3	-36.0699	115.0000	-640.0000
52B O04	FLB-D No. 4	85.6895	958.0000	-211.0000
73A O01	Control-A No.1	293.4921	537.0000	-136.0000
73B O01	Control-B No. 1	44.1649	367.0000	-497.0000
74A O01	AALB-A No.1	101.5301	547.0000	-1373.0000
74A O02	AALB-A No.2	-577.4400	261.0000	-1422.0000
74B O01	AALB-B No.1	-135.0144	1049.0000	-526.0000
74B O02	AALB-B No.2	305.9152	1145.0000	0.0000

Summary of Average Temperature of MSW

Temperature readings of the MSW were made on a daily basis via multiple thermocouple probes permanently installed in the waste. These data are captured and graphically represented in the form of box plots for FLB 5.1, FLB 5.2, AALB 7.4A Lifts 1-3, AALB 7.4B Lifts 1-3, and the Control, in Figures 5-46 through 5-54.

Interpretation of the box plot:



Multiple factors affect the recorded temperature within the landfill, including the location of the probe, depth of probe, atmospheric temperature, and volume and temperature of liquids added. Variability between the probes across a given cell is therefore not unexpected as seen in FLB 5.1. FLB 5.2 shows a relatively stable temperature across probes T03 to T14, with a range of ~5-40ºC, though averaging ~20ºC.

Each lift of the AALB cells shows there to be a relatively good temperature correlation across the lift. This is summarized below in Table 5-36.

TABLE 5-36. SUMMARY OF AVERAGE TEMPERATURE OF MSW

LIFT	APPROX. AVERAGE 10-90TH PERCENTILE TEMPERATURE RANGE (ºC)	APPROX. MEAN TEMPERATURE ACROSS PROBES (ºC)
AALB 7.4A		
Lift 1	15-45	25
Lift 2	15-45	27
Lift 3	12-23	18
AALB 7.4B		
Lift 1	14-45	28
Lift 2	10-45	28
Lift 3	15-35	25

The Control Unit temperature readings are not divided into the subcells A and B but are combined to represent the entire Control Unit 7.3. It should be noted that several of the thermocouple probes in the Control unit produced erroneous readings. Consequently, the results required a significant degree of censoring. In addition, although the data span the period

March 2002 through April 2003, there were large time gaps for several of the probes that biased the readings. The available data from the probes across the landfill are variable and exhibit large temperature differentials. The average mean temperature for the site can be estimated as approximately 17ºC.

LANDFILL GAS (LFG) CHARACTERISTICS

Landfill gas parameters were measured both on-site using a GEM 200 field instrument on a weekly basis, and by sample collection in a 6-liter SUMMA® canister for off-site lab analysis on a quarterly basis. The results documented in this report apply only to the Control Unit (7.3 A and B) and the FLB (Unit 5.1 and 5.2) as these units contain waste of sufficient age to be generating LFG (methanogenis phase).

Summary of Landfill Gas Flow

The collected landfill gas flow rate was measured for both Control cells 7.3 A and B and the FLB cells 5.1 and 5.2. The rate of flow was measured weekly using a calibrated orifice plate at the installed gas monitoring wells within each cell. Control cells 7.3 A and B both have two monitoring wells (referred to as 1 and 2), while each of the FLB cells, 5.1 and 5.2, has one. The results are graphically displayed in Figures 5-55 and 5-56.

The results available for this report span approximately 16 months from January 2002 until May 2003. Landfill gas flow rate has remained steady throughout this period in both Control cells, as shown by the relatively level plots at each of the four monitoring points. In Control cell A, the mean value measured was in the range 47 to 49 scfm at well 1, and 29 to 31 scfm at well 2. In Control cell B, the mean value measured was in the range 45 to 47 scfm at well 1, and 32 to 34 scfm at well 2.

The results for the FLB, over approximately the same period, show a flow of between approximately 300 to 500 scfm in both cells until approximately June 2002 when a significant drop in the flow rate occurred. This steady drop occurred between approximately May and July for FLB 5.1, and between July and September 2002 in FLB 5.2. The production rate then remained relatively constant in a range of 50 to 250 scfm in both cells until May 2003.
.

Figure 5-46. Box Plot of Control Cell Waste Thermocouple Readings (3/2002 - 4/2003)

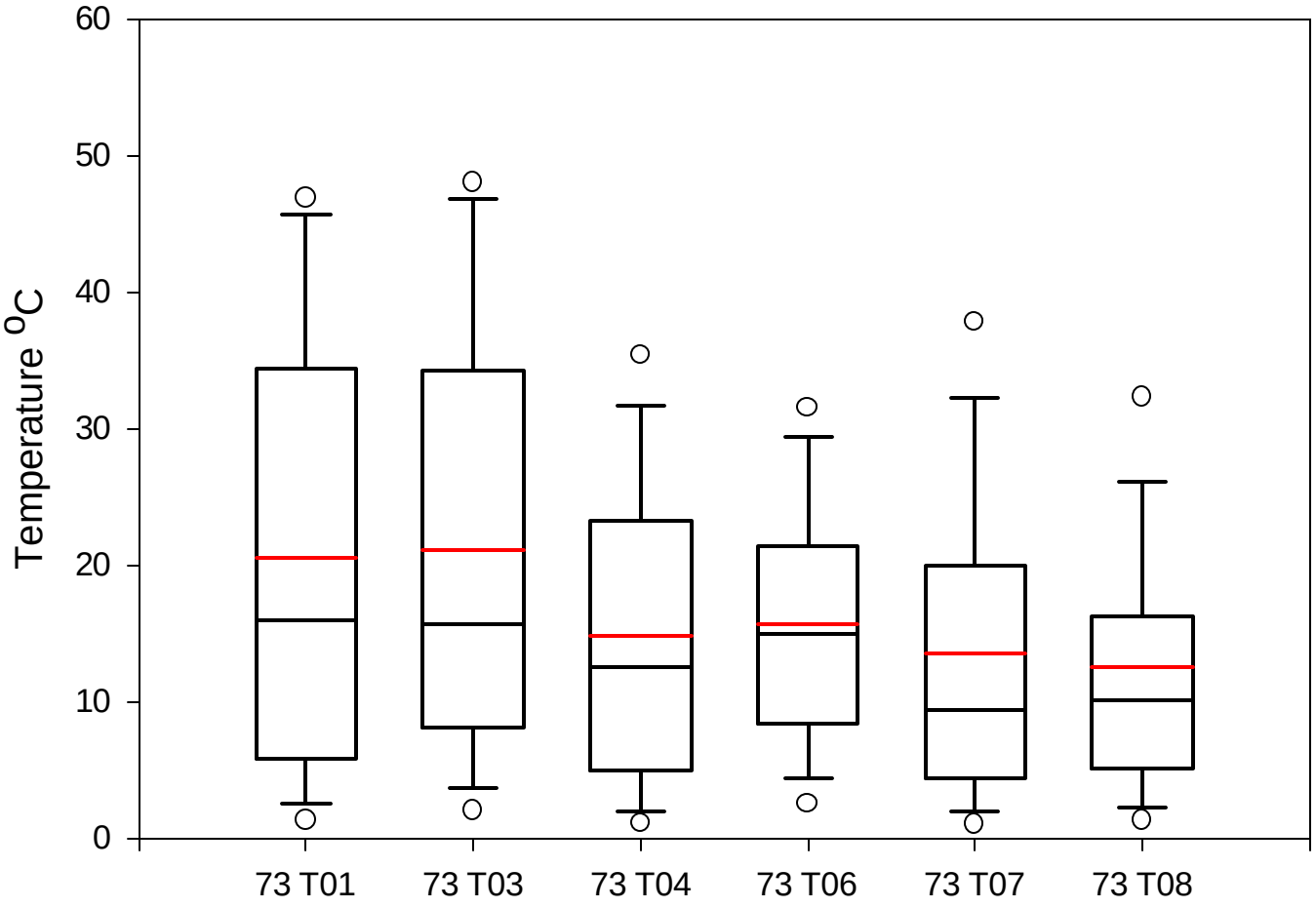


Figure 5-47. FLB (5.1A) Waste Thermocouple Readings (3/12/2002 - 4/1/2003)

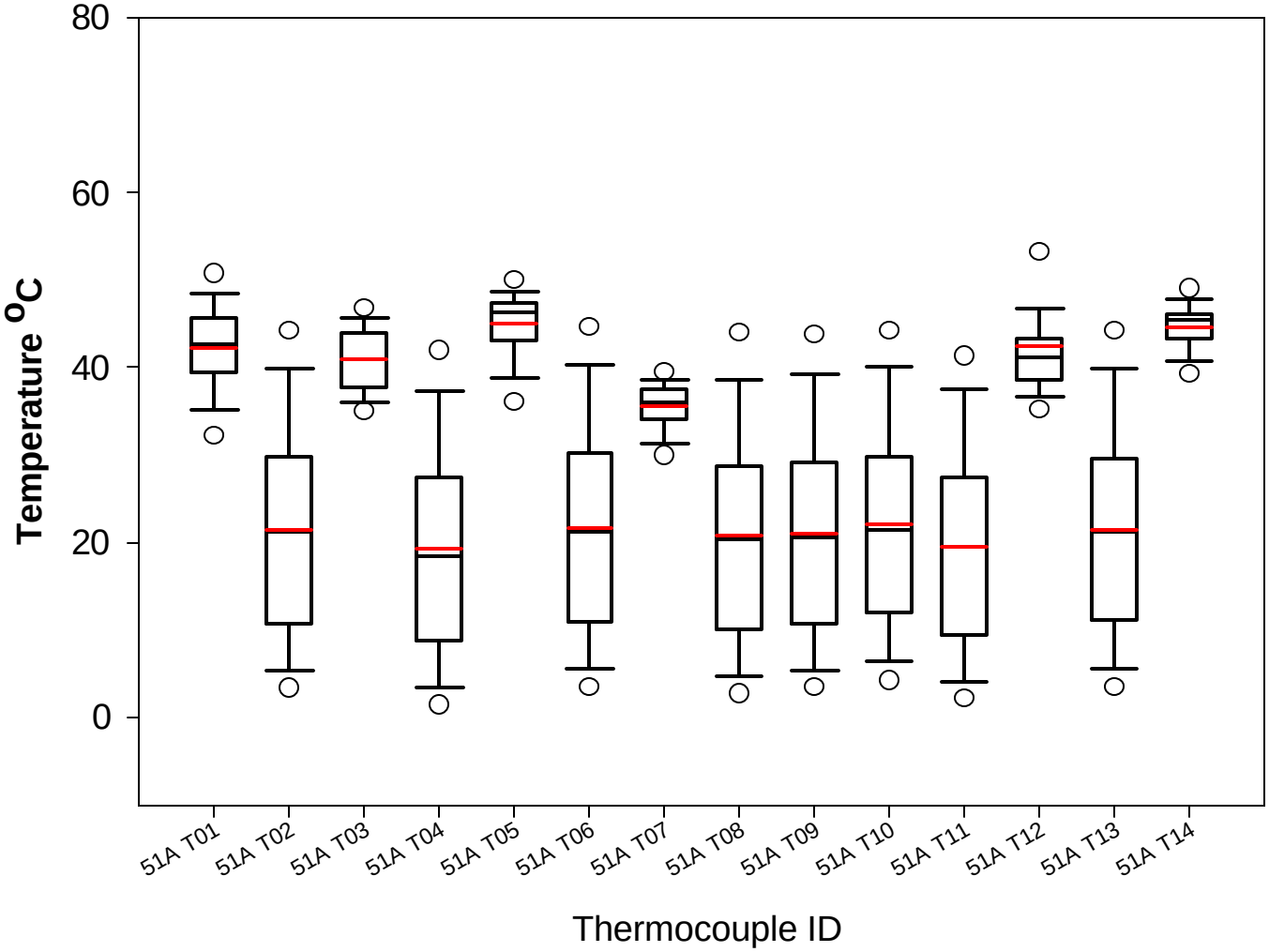


Figure 5-48. FLB (5.2D) Waste Themocouple Readings (3/12/2002 - 4/1/2003)

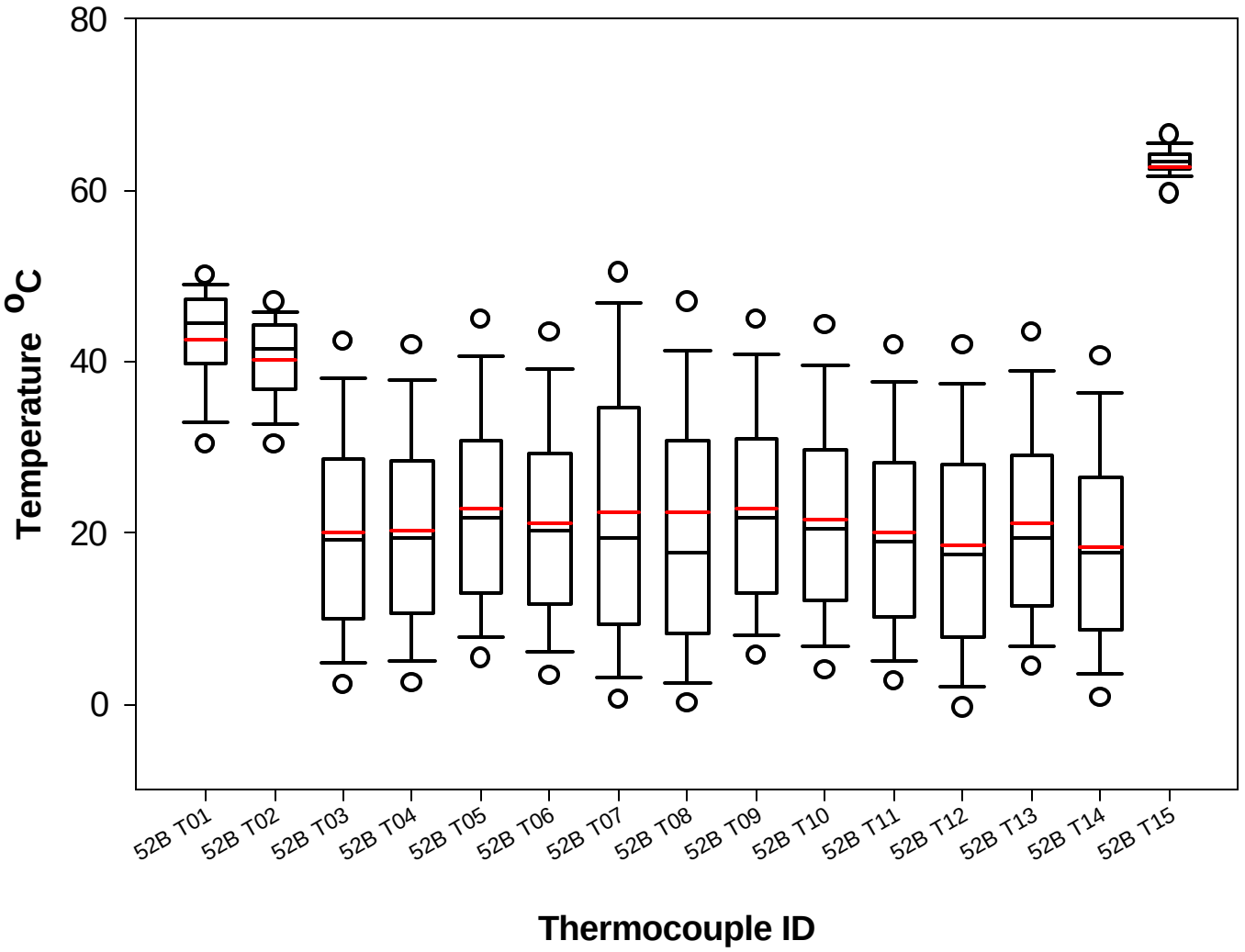


Figure 5-49. AALB (7.4A) Lift 1 Waste Thermocouple Readings (3/13/2002 - 4/1/2003)

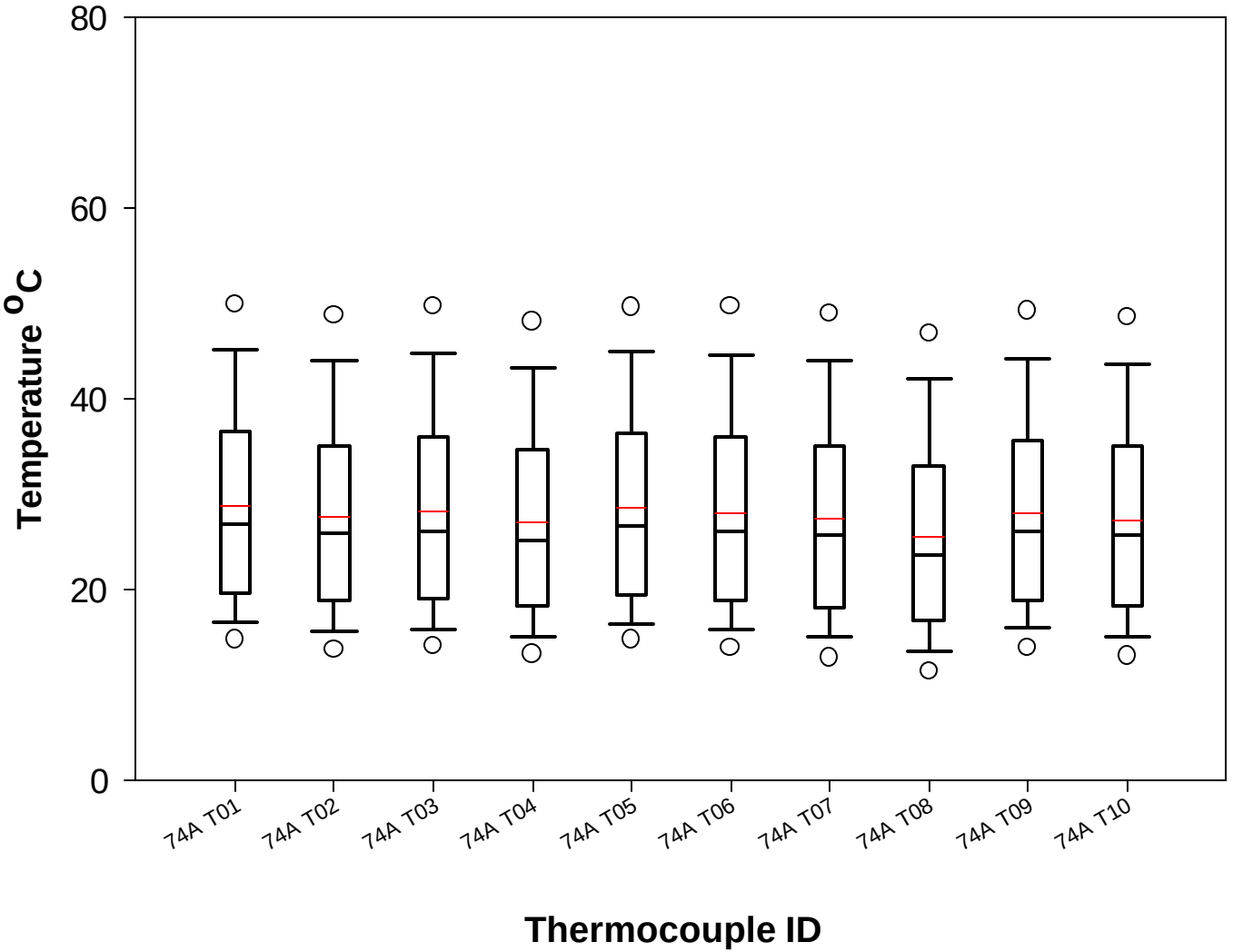


Figure 5-50. AALB (7.4A) Lift 2 Waste Thermocouple Readings (5/29/2002 - 4/1/2003)

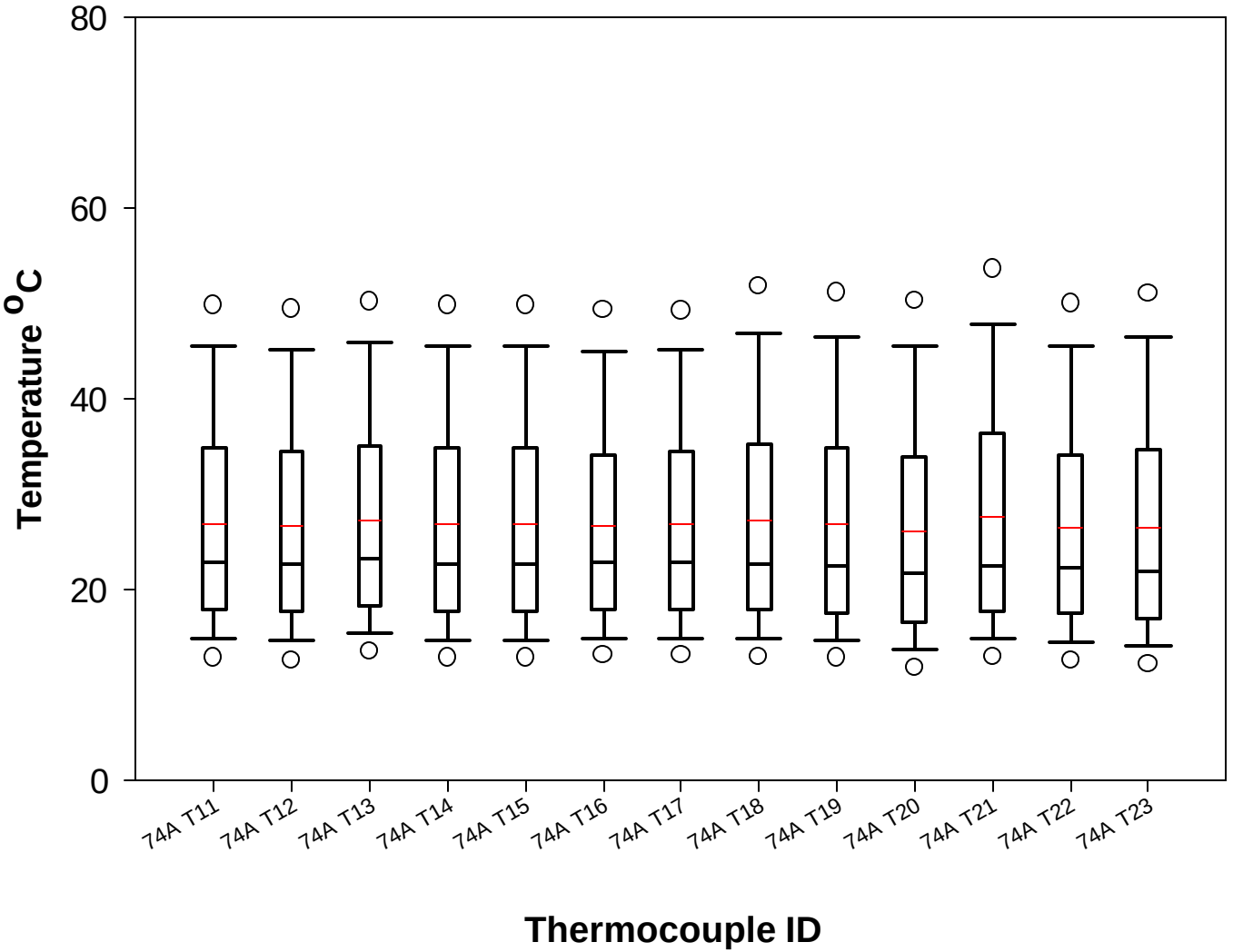


Figure 5-51. AALB (7.4A) Lift 3 Waste Thermocouple Readings (11/4/2002 - 4/1/2003)

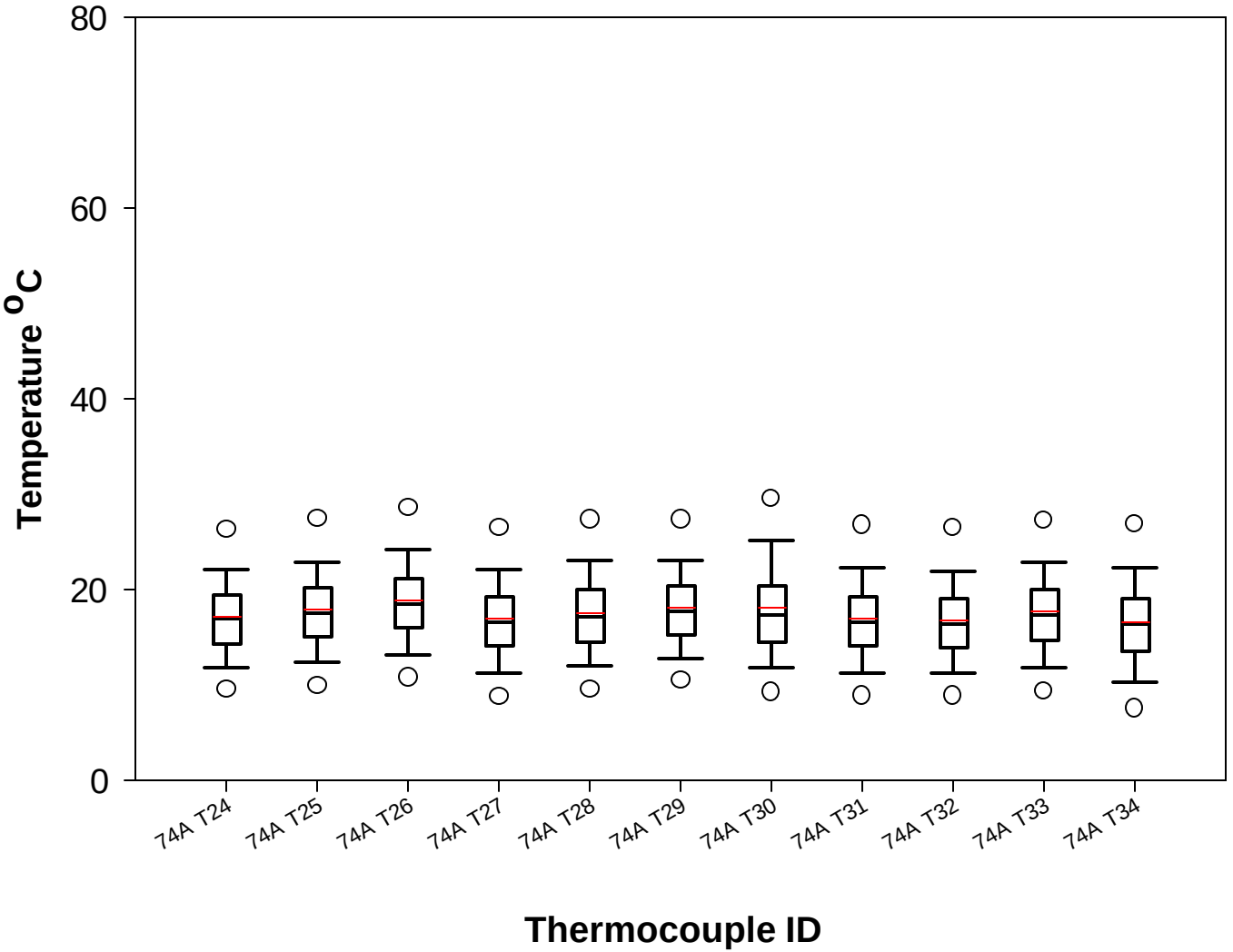


Figure 5-52. AALB (7.4B) Lift 1 Waste Thermocouple Readings (3/13/2002 - 4/1/2003)

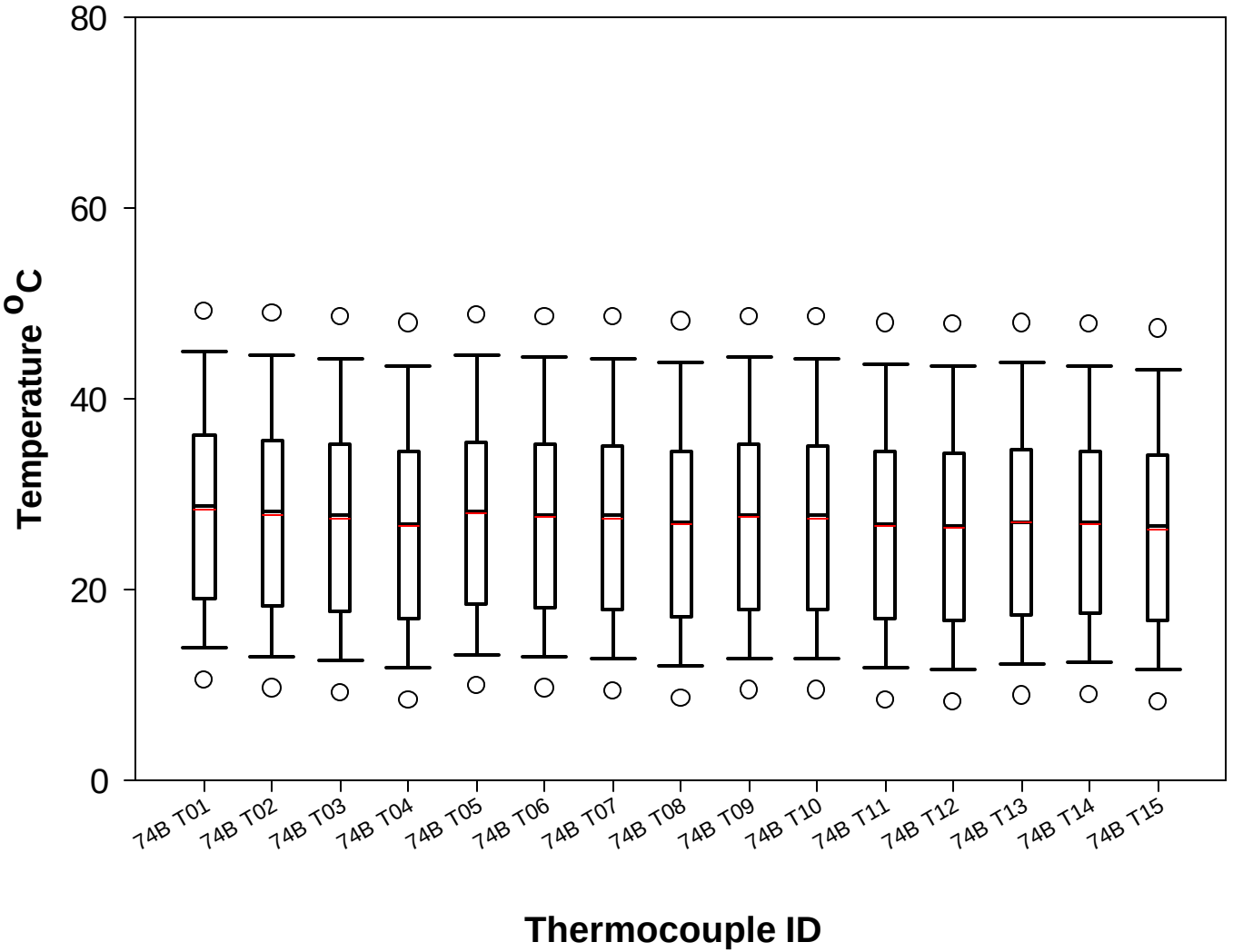


Figure 5-53. AALB (7.4B) Lift 2 Waste Thermocouple Readings (7/1/2002 - 4/1/2003)

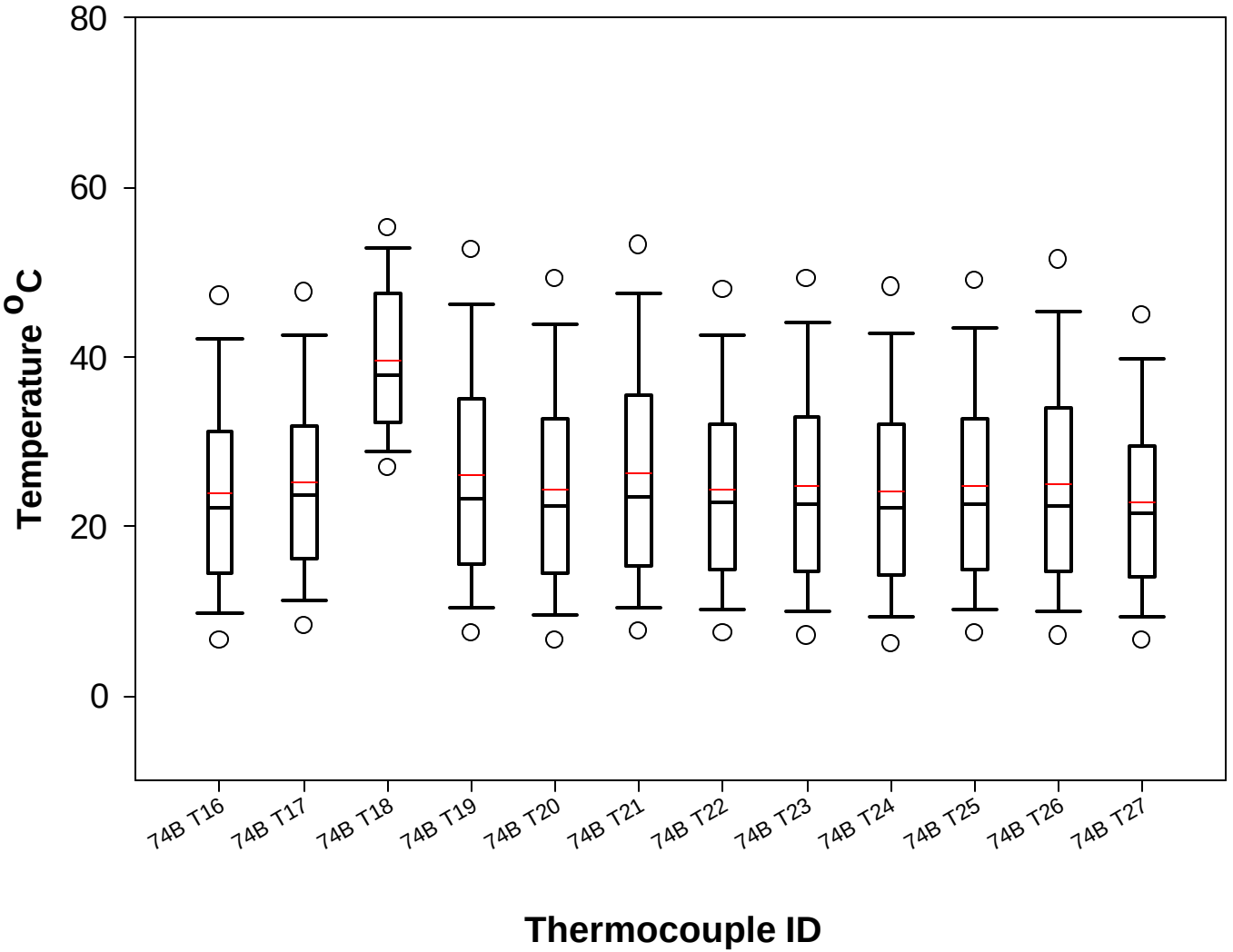


Figure 5-54. AALB (7.4B) Lift 3 Waste Thermocouple Readings (2/3/2003 - 4/1/2003)

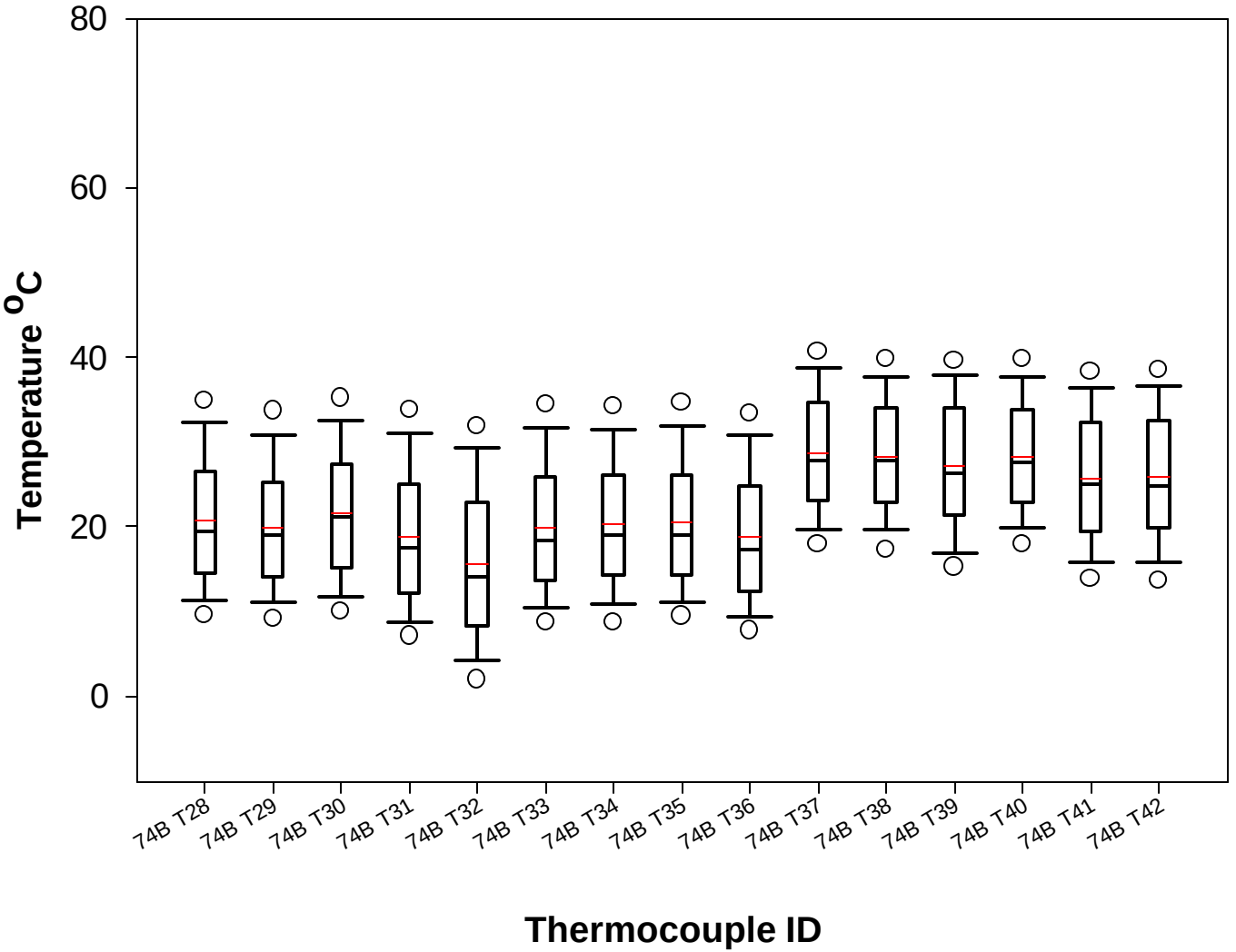


Figure 5-55. Landfill Gas Flow vs. Time for Control (7.3) A and B

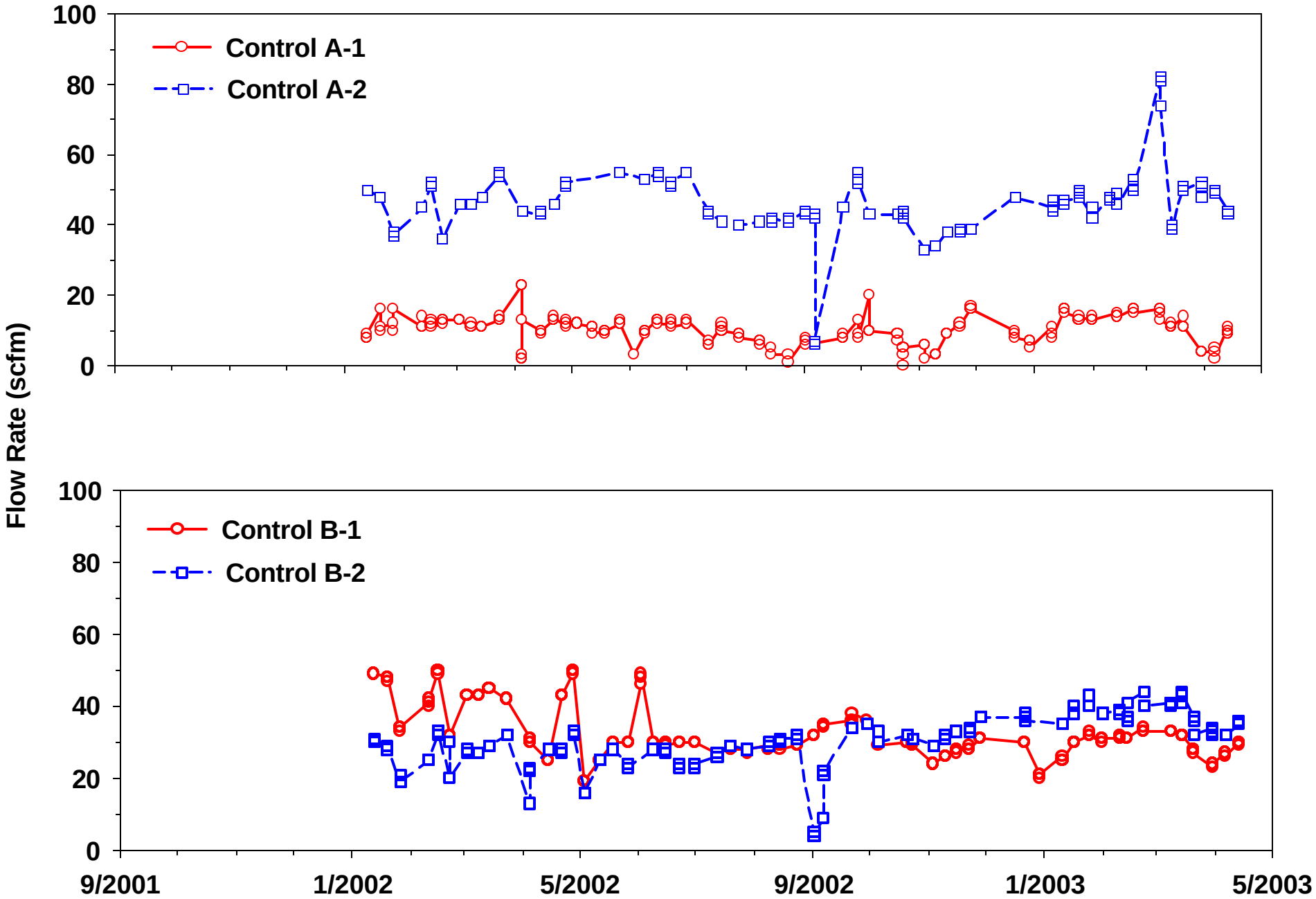
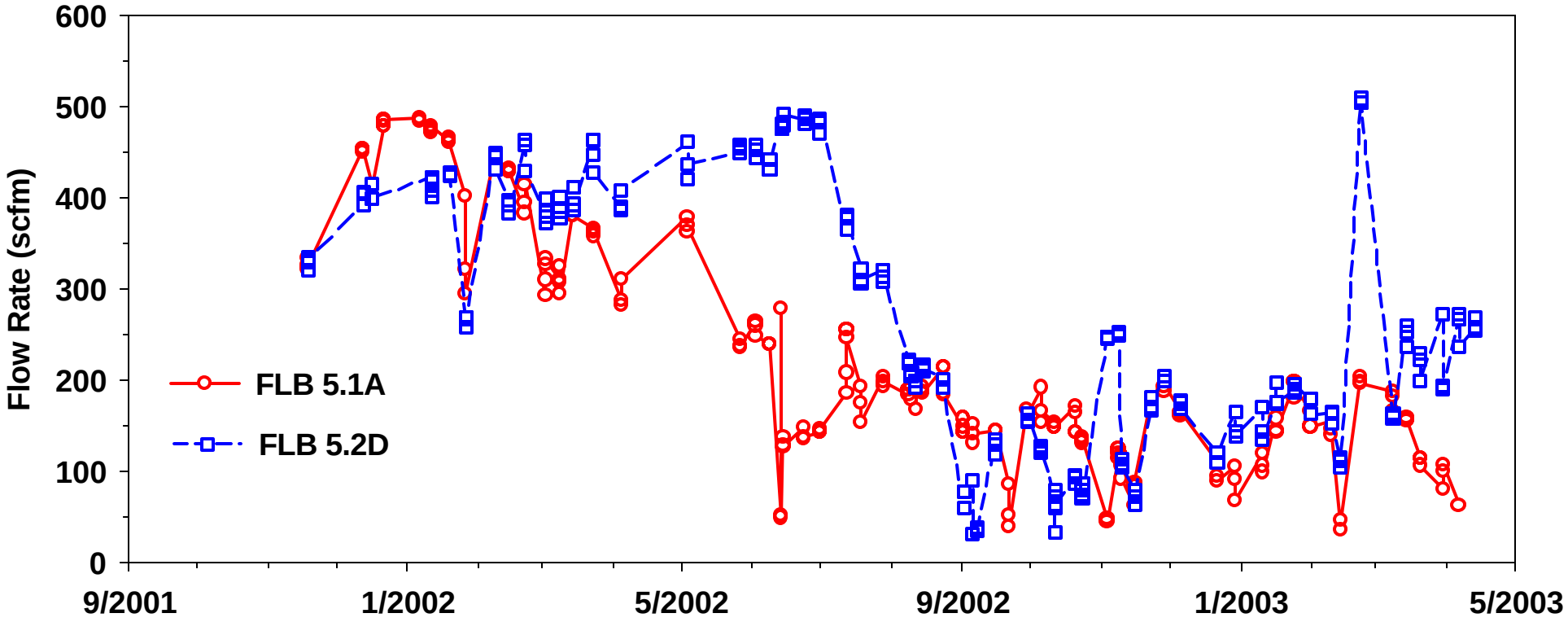


Figure 5-56. Landfill Gas Flow vs. Time for FLB 5.1A and 5.2D



Summary of Landfill Gas Temperature

The landfill gas temperature was measured for both Control cells 7.3 A and B and the FLB cells 5.1 and 5.2. The temperature was measured weekly using a bimetal thermometer permanently installed at either the gas header, metering station piping or gas well within each cell. Control cells 7.3 A and B both have two monitoring wells (referred to as 1 and 2), while each of the FLB cells, 5.1 and 5.2, has one. The results are graphically displayed in Figures 5-57 and 5-58.

The results available for this report span approximately 16 months from January 2002 until May 2003. Landfill gas temperature has remained steady throughout this period in both Control cells, as shown by the relatively level plots at each of the four monitoring points. The mean temperature varied between the monitoring wells, see Table 5-37.

TABLE 5-37. SUMMARY OF LANDFILL GAS TEMPERATURES

Location	Approx. Mean Temperature (ºF)	Max Temperature (ºF)	Min Temperature (ºF)
Control Cell A			
Monitoring Well 1	111	120	98
Monitoring Well 2	101	120* (108 typical)	95
Control Cell B			
Monitoring Well 1	102	110	98
Monitoring Well 2	94	102	75* (90 typical)

* Atypical value.

The results for the FLB, over approximately the same period, showed considerable variation in both cells throughout the period, although the overall trend for both cells was similar. Both cells showed a gradual decline in temperature until March 2002 from over 90ºF to approximately 75-80ºF. From March until September 2002, there was a gradual increase in LFG temperature to a maximum of about 95ºF. This pattern was repeated with a decline in temperature over the Winter period until March 2003, when the temperature began to rise again. The minimum temperature reached in FLB 5.1 was approximately 72ºF in January 2003 and 60ºF in FLB 5.2 in February/March 2003.

Figure 5-57. Landfill Gas Temperature vs. Time for Control 7.3A and 7.3B

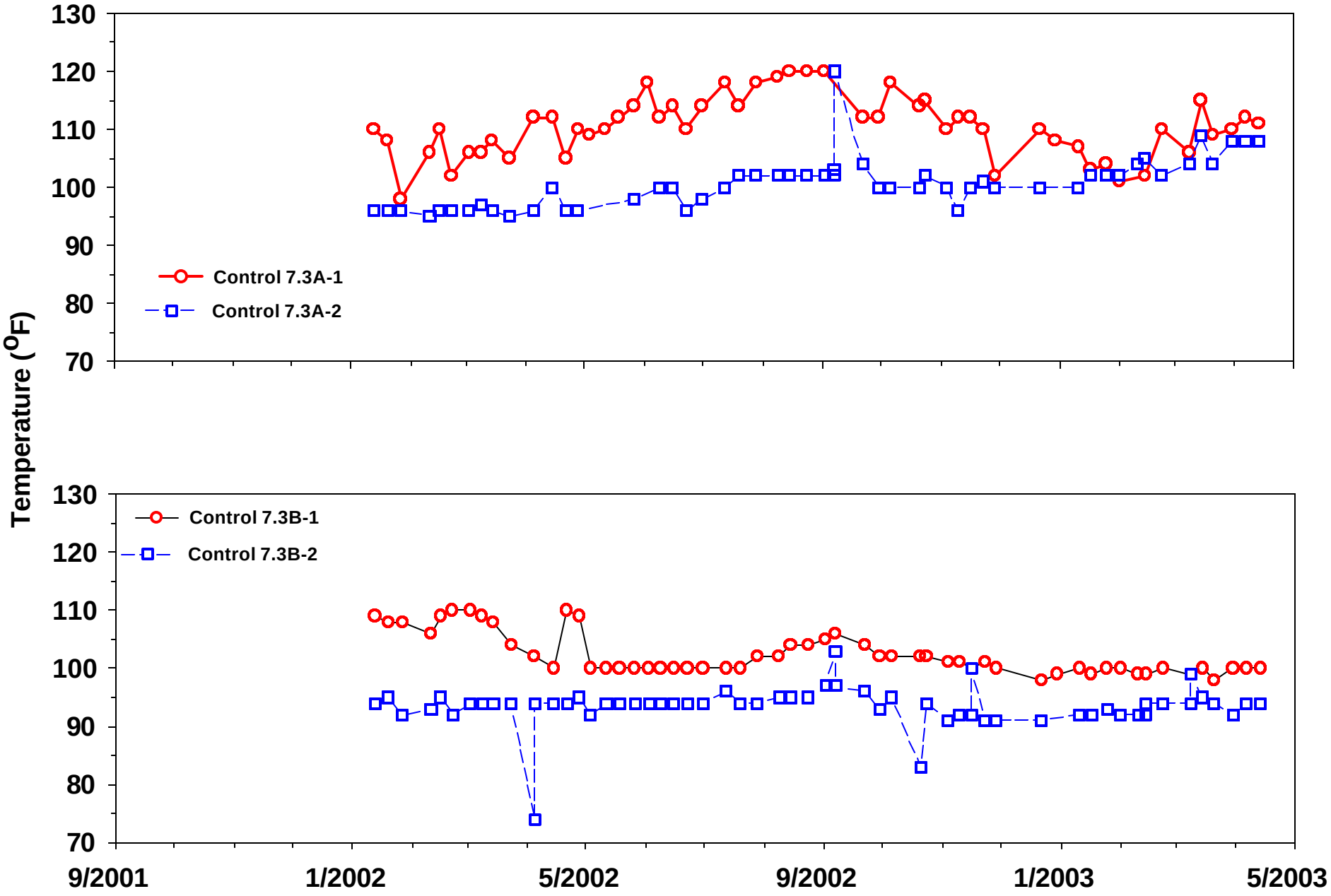
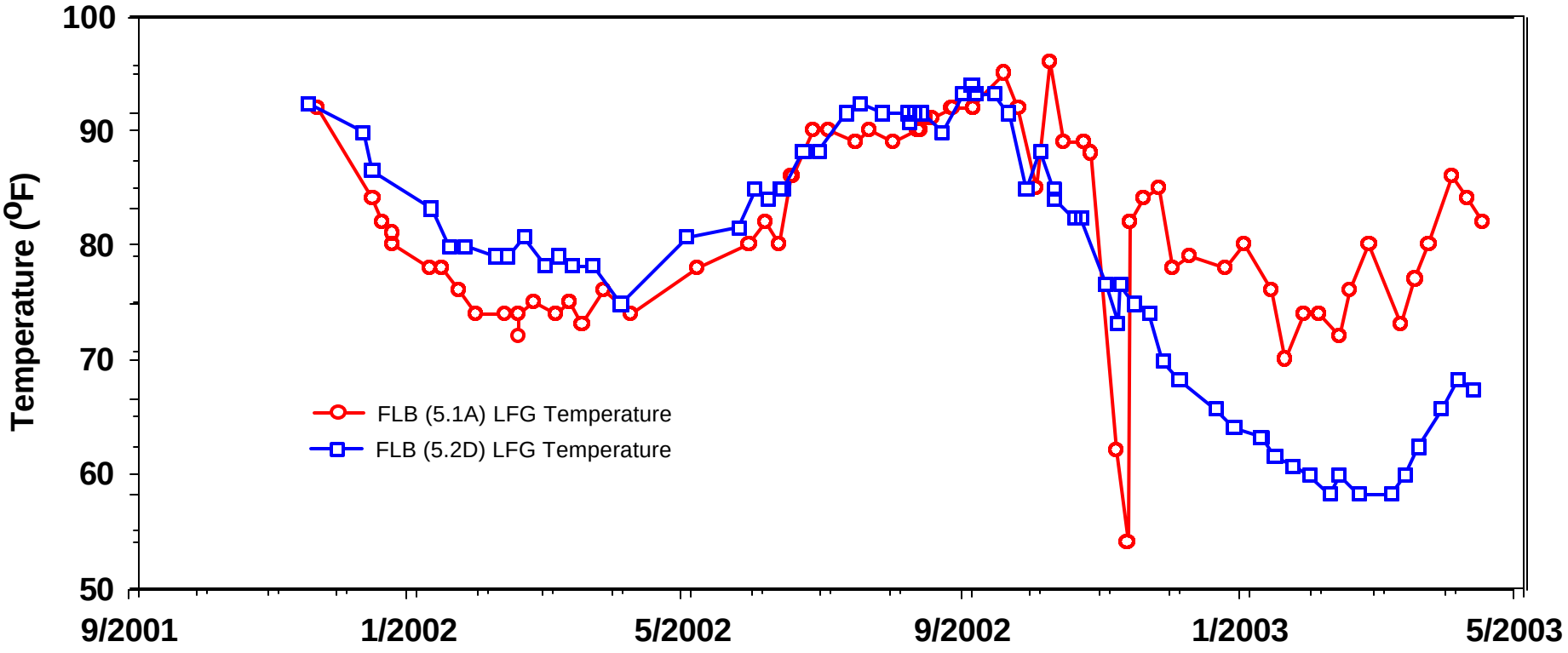


Figure 5-58. Landfill Gas Temperature vs. Time for FLB 5.1A and 5.2D



Summary of Landfill Gas Composition

The landfill gas composition was measured for both Control cells 7.3 A and B and the FLB cells 5.1 and 5.2. The composition was measured weekly using the GEM 200 at the installed gas monitoring wells within each cell. Control cells 7.3 A and B both have two monitoring wells (referred to as 1 and 2), while each of the FLB cells, 5.1 and 5.2, has one. The results are graphically displayed in Figures 5-59, 5-60 and 5-61.

The bulk gas compositions for both Control Units, at both gas wells, remained constant for the period January 2002 until May 2003. The following table gives the approximate mean values for each component at each location. Results are summarized below in Table 5-38.

TABLE 5-38. SUMMARY OF LANDFILL GAS COMPOSITION IN THE CONTROL

Location	% Methane (v/v)	% Carbon Dioxide (v/v)	% Oxygen (v/v)
Control Unit A			
Monitoring Well 1	60	40	0
Monitoring Well 2	60	40	0
Control Unit B			
Monitoring Well 1	59	41	0
Monitoring Well 2	59	40	0

The bulk gas compositions in the FLB units showed greater variability over the period September 2001 until May 2003. However, results from Unit 5.1 were sufficiently consistent to justify calculating approximate mean values for the period. Gas composition is summarized below in Table 5-39.

TABLE 5-39. SUMMARY OF LANDFILL GAS COMPOSITON IN FLB5.1

FLB Unit 5.1: Approximate Mean Gas Composition	
% Methane (v/v)	52
% Carbon Dioxide (v/v)	36
% Oxygen (v/v)	2

FLB Unit 5.2 bulk gas composition values were too variable after May 2002 to draw a meaningful average. The following table provides the maximum and minimum value recorded for each component over the period. Results are summarized below in Table 5-40.

TABLE 5-40. SUMMARY OF LANDFILL GAS COMPOSITION IN FLB 5.2

FLB Unit 5.2: Max and Min Gas Composition Values		
Component	*Maximum % (v/v)*	*Minimum % (v/v)*
Methane	62	20
Carbon Dioxide	47	4
Oxygen	17	0

Figure 5-59. Landfill Gas Composition vs. Time for Control 7.3A

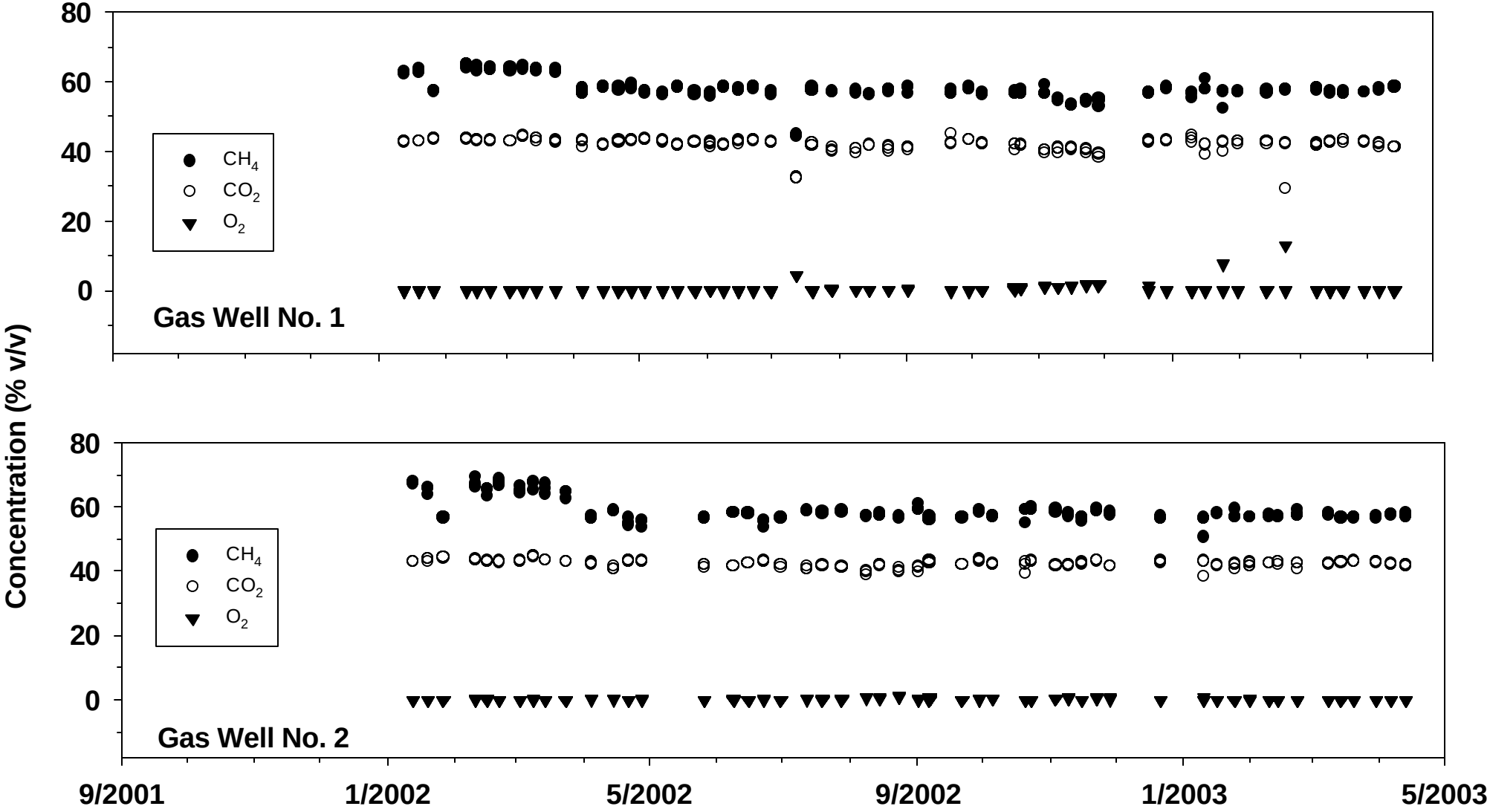


Figure 5-60. Landfill Gas Composition vs. Time for Control 7.3B

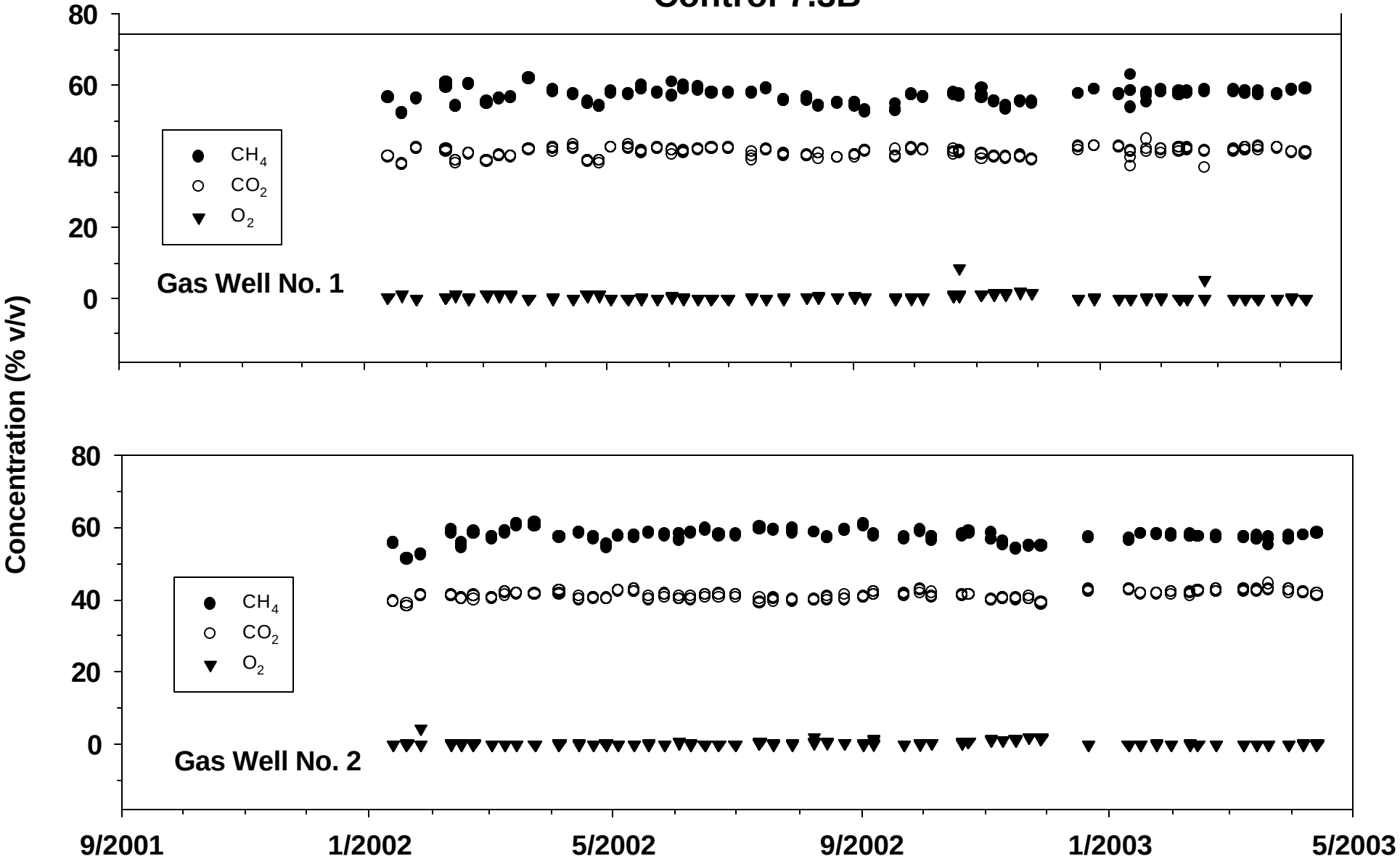
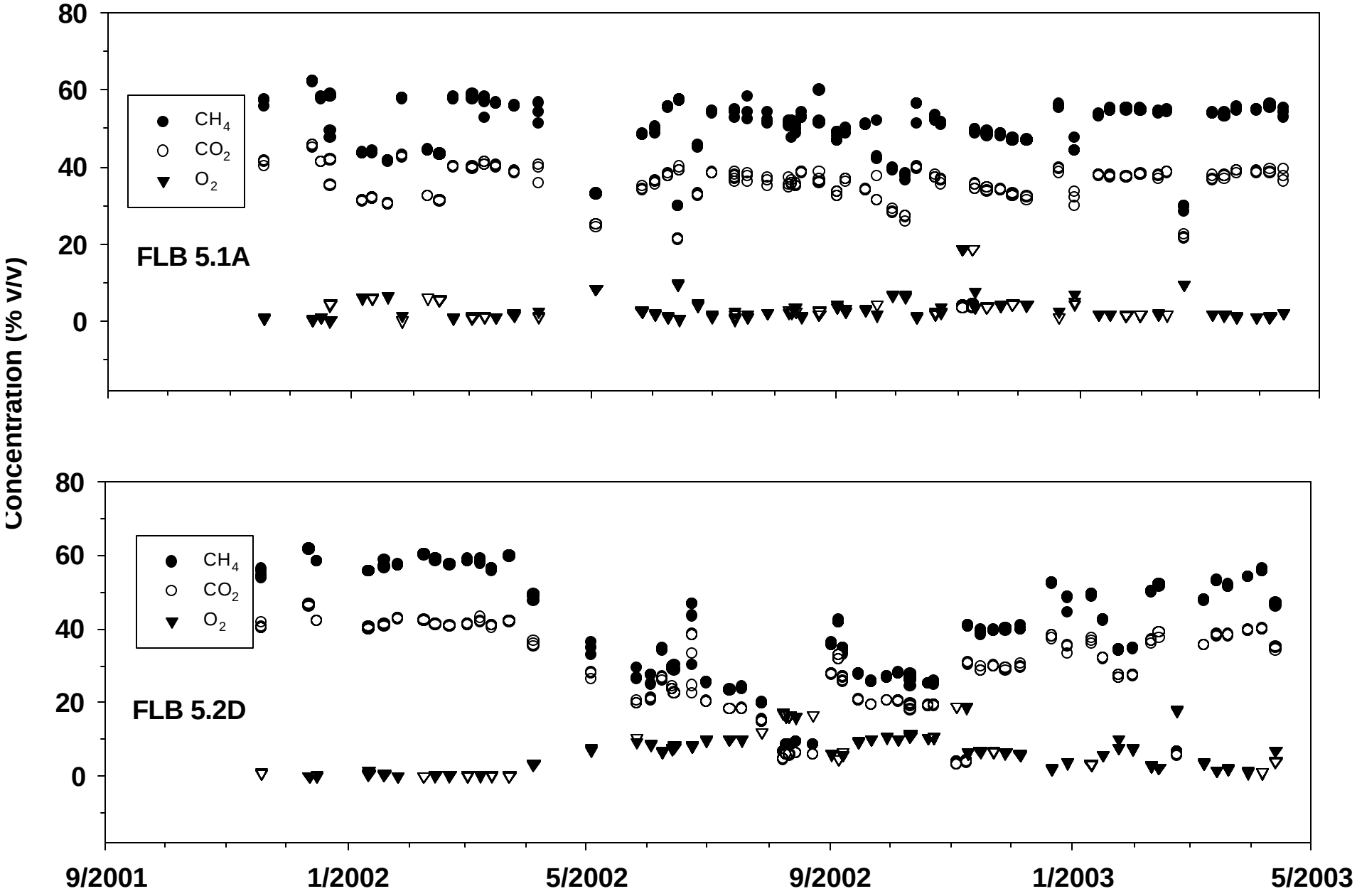


Figure 5-61. Landfill Gas Composition vs. Time for FLB 5.1A and 5.2D



Summary of Landfill Gas Non-Methane Organic Compounds (NMOCs)

The landfill gas total NMOC content was measured for both Control cells 7.3 A and B and the FLB cells 5.1 and 5.2. The NMOC content was measured quarterly by extracting a LFG sample into a 6-liter SUMMA® canister from the installed gas monitoring wells within each cell, and submitting for off-site lab analysis. The results are displayed as bar charts in Figures 5-62 and 5-63.

Four samples were taken from each of the four monitoring wells in the Control units in March, June, November and December 2002. Five samples were taken from both monitoring wells in the FLB in December 2001, March, June, November and December 2002. The NMOC levels remained relatively constant, with significantly lower values seen in the FLB units. Results are summarized below in Table 5-41.

TABLE 5-41. SUMMARY OF LANDFILL GAS NMOCS

Maximum and Minimum Total NMOC Values Seen in Control and FLB Units		
Location	*Maximum Conc. (ppm-C, as hexane)*	*Minimum Conc. (ppm-C, as hexane)*
Control Unit 7.3A		
Gas Monitoring Well 1 Gas Monitoring Well 2	1383 1833	883 1333
Control Unit 7.3B		
Gas Monitoring Well 1 Gas Monitoring Well 2	883 850	583 517
FLB Unit 5.1		
Gas Monitoring Well	350	200
FLB Unit 5.2		
Gas Monitoring Well	383	183

Figure 5-62. Total NMOCs vs. Time for Control (7.3A & B)

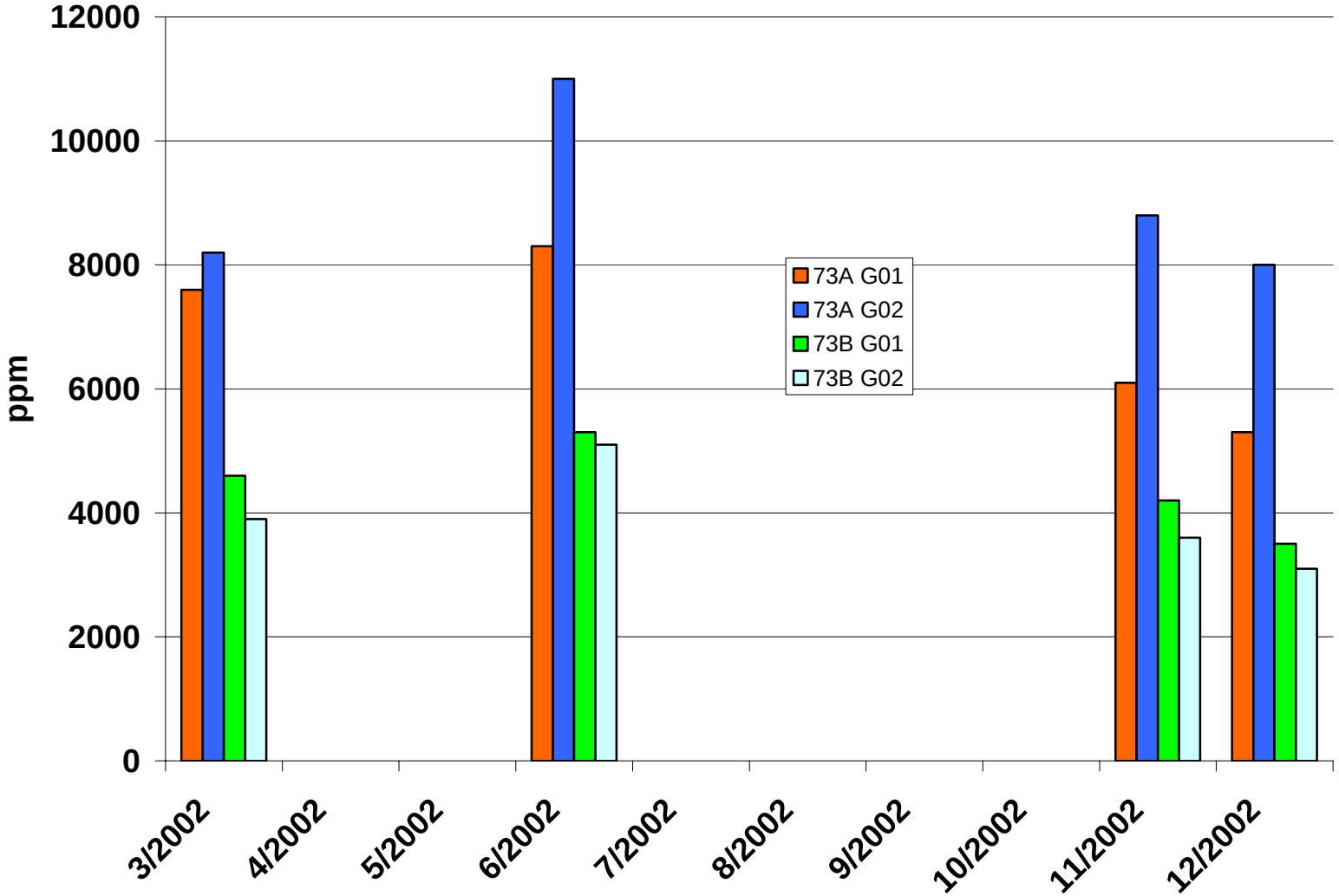
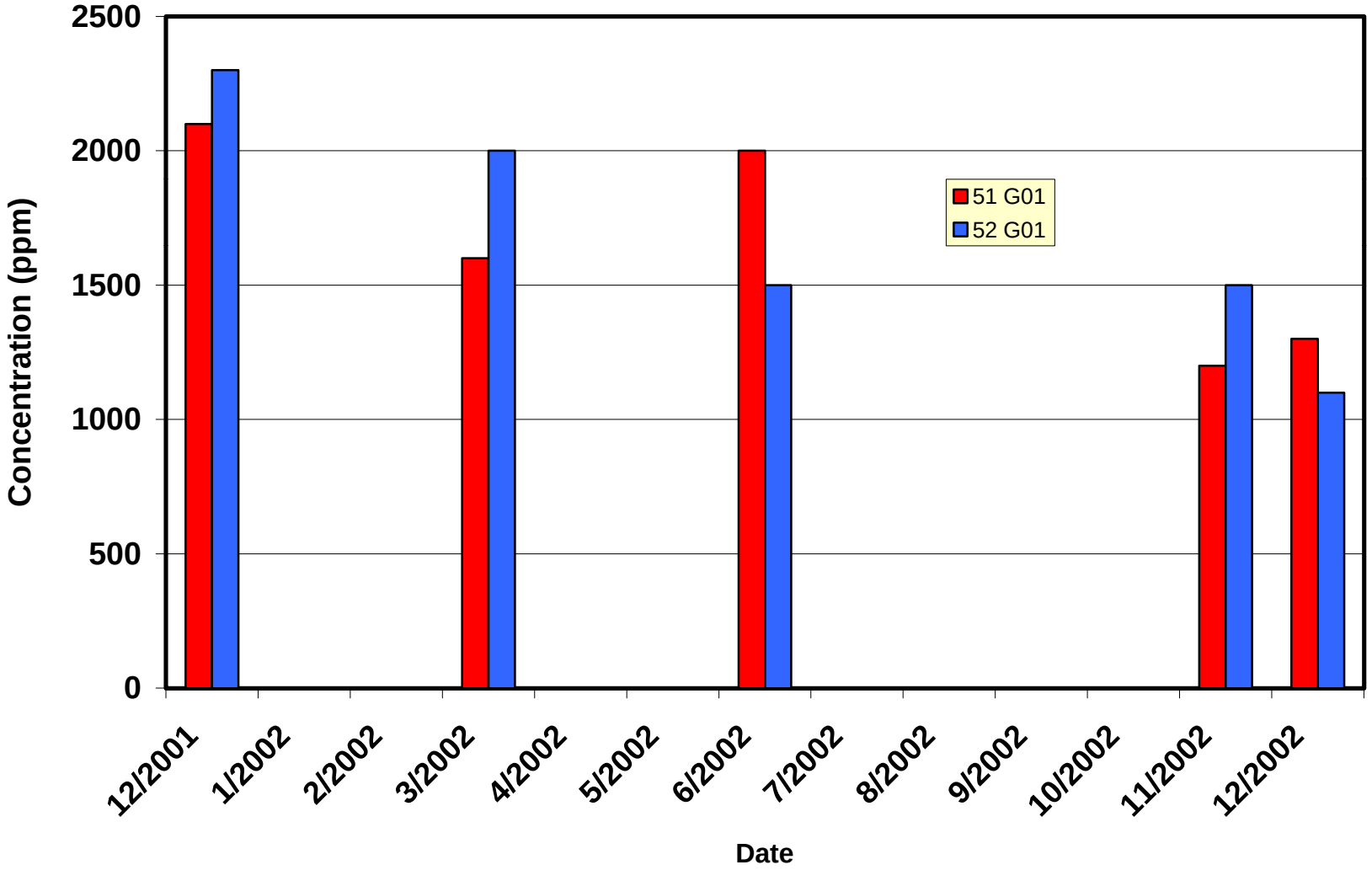


Figure 5-63. Total NMOCs vs. Time for FLB (5.1A and 5.2D)



Summary of Landfill Gas Hazardous Air Pollutants (HAPs)

The presence of HAPs in LFG was measured for both Control cells 7.3 A and B, and the FLB cells 5.1 and 5.2. HAPs were measured quarterly by extracting a LFG sample into a 6-liter SUMMA® canister from the installed gas monitoring wells within each cell, and submitting for off-site lab analysis. The results are displayed as tables in Tables 5-42 through 5-45.

The readings for the Control units cover the period March 21, 2002 through December 19, 2002. The readings for the FLB units cover the period December 19, 2001 through December 19, 2002. For Control and FLB samples, HAPs were below detection limits in at least 64 percent of the samples.

TABLE 5-42. SUMMARY OF LANDFILL GAS HAZARDOUS AIR POLLUTANTS CONTROL 7.3A (GAS WELL 1 AND GAS WELL 2), MARCH 21, 2002 THROUGH DECEMBER 19, 2002

HAPs Compounds	Number of Readings	Number of Non-Detects (ND)	Number of Readings 1-1000 µg/l	Number of Readings >1000 µg/l
Dichlorodifluoromethane	8	0	2	6
Chloromethane	8	8	0	0
1,2-Dichloro-1,1,2,2-tetrafluoroethane	8	6	2	0
Vinyl chloride	8	7	1	0
Bromomethane	8	8	0	0
Chloroethane	8	8	0	0
Trichlorofluoromethane	8	8	0	0
1,1-Dichloroethene	8	6	2	0
Carbon disulfide	8	8	0	0
1,1,2-Trichloro-1,2,2-trifluoroethane	8	8	0	0
Acetone	8	0	0	8
Methylene chloride	8	4	3	1
Trans-1,2-Dichloroethene	8	8	0	0
1,1-Dichloroethane	8	8	0	0
Vinyl acetate	8	8	0	0
Cis-1,2-Dichloroethene	8	0	6	2
2-Butanone (MEK)	8	0	0	8
Chloroform	8	8	0	0
1,1,1-Trichloroethane	8	8	0	0
Carbon tetrachloride	8	8	0	0
Benzene	8	0	8	0
1,2-Dichloroethane	8	8	0	0
Trichloroethene	8	1	7	0
1,2-Dichloropropane	8	8	0	0
Bromodichloromethane	8	8	0	0
Cis-1,3-Dichloropropene	8	8	0	0
4-Methyl-2-pentanone (MIBK)	8	0	0	8
Toluene	8	0	0	8
Trans-1,3-Dichloropropene	8	8	0	0
1,1,2-Trichloroethane	8	8	0	0
Tetrachloroethene	8	0	3	5
2-Hexanone	8	8	0	0

HAPs Compounds	Number of Readings	Number of Non-Detects (ND)	Number of Readings 1-1000 µg/l	Number of Readings >1000 µg/l
Dibromochloromethane	8	8	0	0
1,2-Dibromoethane (EDB)	8	8	0	0
Chlorobenzene	8	8	0	0
Ethylbenzene	8	0	0	8
Xylenes (total)	8	0	0	8
Styrene	8	0	0	8
Bromoform	8	8	0	0
1,1,2,2-Tetrachloroethane	8	8	0	0
Benzyl chloride	8	8	0	0
4-Ethyltoluene	8	0	0	8
1,3,5-Trimethylbenzene	8	0	2	6
1,2,4-Trimethylbenzene	8	0	0	8
1,3-Dichlorobenzene	8	8	0	0
1,4-Dichlorobenzene	8	4	2	2
1,2-Dichlorobenzene	8	8	0	0
1,2,4-Trichlorobenzene	8	8	0	0
Hexachlorobutadiene	8	8	0	0
Total	**392**	**260**	**38**	**94**

TABLE 5-43. SUMMARY OF LANDFILL GAS HAZARDOUS AIR POLLUTANTS CONTROL 7.3B (GAS WELL 1 AND GAS WELL 2), MARCH 21, 2002 THROUGH DECEMBER 19, 2002

HAPs Compounds	Number of Readings	Number of Non-Detects (ND)	Number of Readings 1-1000 µg/l	Number of Readings >1000 µg/l
Dichlorodifluoromethane	8	8	2	6
Chloromethane	8	8	0	0
1,2-Dichloro-1,1,2,2-tetrafluoroethane	8	6	2	0
Vinyl chloride	8	1	2	5
Bromomethane	8	8	0	0
Chloroethane	8	8	0	0
Trichlorofluoromethane	8	7	1	0
1,1-Dichloroethene	8	8	0	0
Carbon disulfide	8	8	0	0
1,1,2-Trichloro-1,2,2-trifluoroethane	8	8	0	0
Acetone	8	0	0	8
Methylene chloride	8	8	0	0
Trans-1,2-Dichloroethene	8	8	0	0
1,1-Dichloroethane	8	5	3	0
Vinyl acetate	8	8	0	0
Cis-1,2-Dichloroethene	8	0	4	4
2-Butanone (MEK)	8	0	0	8
Chloroform	8	8	0	0
1,1,1-Trichloroethane	8	8	0	0
Carbon tetrachloride	8	8	0	0
Benzene	8	0	5	3
1,2-Dichloroethane	8	8	0	0
Trichloroethene	8	0	8	0
1,2-Dichloropropane	8	8	0	0

HAPs Compounds	Number of Readings	Number of Non-Detects (ND)	Number of Readings 1-1000 µg/l	Number of Readings >1000 µg/l
Bromodichloromethane	8	8	0	0
Cis-1,3-Dichloropropene	8	8	0	0
4-Methyl-2-pentanone (MIBK)	8	1	0	7
Toluene	8	0	0	8
Trans-1,3-Dichloropropene	8	8	0	0
1,1,2-Trichloroethane	8	8	0	0
Tetrachloroethene	8	0	5	3
2-Hexanone	8	8	0	0
Dibromochloromethane	8	8	0	0
1,2-Dibromoethane (EDB)	8	8	0	0
Chlorobenzene	8	8	0	0
Ethylbenzene	8	0	0	8
Xylenes (total)	8	0	0	8
Styrene	8	0	3	5
Bromoform	8	8	0	0
1,1,2,2-Tetrachloroethane	8	8	0	0
Benzyl chloride	8	8	0	0
4-Ethyltoluene	8	0	0	8
1,3,5-Trimethylbenzene	8	0	5	3
1,2,4-Trimethylbenzene	8	0	0	8
1,3-Dichlorobenzene	8	8	0	0
1,4-Dichlorobenzene	8	6	1	1
1,2-Dichlorobenzene	8	8	0	0
1,2,4-Trichlorobenzene	8	8	0	0
Hexachlorobutadiene	8	8	0	0
Total	**392**	**258**	**41**	**93**

TABLE 5-44. SUMMARY OF LANDFILL GAS HAZARDOUS AIR POLLUTANTS FLB 5.1(GAS WELL 1), DECEMBER 19, 2001 THROUGH DECEMBER 19, 2002

HAPs Compounds	Number of Readings	Number of Non-Detects (ND)	Number of Readings 1-100 µg/l	Number of Readings >100 µg/l
Dichlorodifluoromethane	5	0	5	0
Chloromethane	5	5	0	0
1,2-Dichloro-1,1,2,2-tetrafluoroethane	5	4	1	0
Vinyl chloride	5	0	4	1
Bromomethane	5	5	0	0
Chloroethane	5	5	0	0
Trichlorofluoromethane	5	5	0	0
1,1-Dichloroethene	5	5	0	0
Carbon disulfide	5	5	0	0
1,1,2-Trichloro-1,2,2-trifluoroethane	5	5	0	0
Acetone	5	0	0	5
Methylene chloride	5	3	2	0
Trans-1,2-Dichloroethene	5	5	0	0
1,1-Dichloroethane	5	4	1	0
Vinyl acetate	5	5	0	0
Cis-1,2-Dichloroethene	5	0	5	0
2-Butanone (MEK)	5	0	0	5

HAPs Compounds	Number of Readings	Number of Non-Detects (ND)	Number of Readings 1-100 µg/l	Number of Readings >100 µg/l
Chloroform	5	5	0	0
1,1,1-Trichloroethane	5	5	0	0
Carbon tetrachloride	5	5	0	0
Benzene	5	0	5	0
1,2-Dichloroethane	5	5	0	0
Trichloroethene	5	2	3	0
1,2-Dichloropropane	5	5	0	0
Bromodichloromethane	5	5	0	0
Cis-1,3-Dichloropropene	5	5	0	0
4-Methyl-2-pentanone (MIBK)	5	0	4	1
Toluene	5	0	0	5
Trans-1,3-Dichloropropene	5	5	0	0
1,1,2-Trichloroethane	5	5	0	0
Tetrachloroethene	5	1	4	0
2-Hexanone	5	5	0	0
Dibromochloromethane	5	5	0	0
1,2-Dibromoethane (EDB)	5	5	0	0
Chlorobenzene	5	5	0	0
Ethylbenzene	5	0	0	5
Xylenes (total)	5	5	0	0
Styrene	5	3	2	0
Bromoform	5	5	0	0
1,1,2,2-Tetrachloroethane	5	5	0	0
Benzyl chloride	5	5	0	0
4-Ethyltoluene	5	0	0	5
1,3,5-Trimethylbenzene	5	0	5	0
1,2,4-Trimethylbenzene	5	0	0	5
1,3-Dichlorobenzene	5	5	0	0
1,4-Dichlorobenzene	5	0	5	0
1,2-Dichlorobenzene	5	5	0	0
1,2,4-Trichlorobenzene	5	5	0	0
Hexachlorobutadiene	5	5	0	0
Total	**245**	**167**	**46**	**32**

TABLE 5-45. SUMMARY OF LANDFILL GAS HAZARDOUS AIR POLLUTANTS FLB 5.2(GAS WELL 2), DECEMBER 19, 2001 THROUGH DECEMBER 19

HAPs Compounds	Number of Readings	Number of Non-Detects (ND)	Number of Readings 1-100 µg/l	Number of Readings >100 µg/l
Dichlorodifluoromethane	5	0	5	0
Chloromethane	5	5	0	0
1,2-Dichloro-1,1,2,2-tetrafluoroethane	5	4	1	0
Vinyl chloride	5	0	5	1
Bromomethane	5	5	0	0
Chloroethane	5	5	0	0
Trichlorofluoromethane	5	4	1	0
1,1-Dichloroethene	5	5	0	0
Carbon disulfide	5	5	0	0
1,1,2-Trichloro-1,2,2-trifluoroethane	5	5	0	0

HAPs Compounds	Number of Readings	Number of Non-Detects (ND)	Number of Readings 1-100 µg/l	Number of Readings >100 µg/l
Acetone	5	0	1	4
Methylene chloride	5	3	2	0
Trans-1,2-Dichloroethene	5	5	0	0
1,1-Dichloroethane	5	4	1	0
Vinyl acetate	5	5	0	0
Cis-1,2-Dichloroethene	5	0	5	0
2-Butanone (MEK)	5	0	1	4
Chloroform	5	5	0	0
1,1,1-Trichloroethane	5	5	0	0
Carbon tetrachloride	5	5	0	0
Benzene	5	0	5	0
1,2-Dichloroethane	5	5	0	0
Trichloroethene	5	1	4	0
1,2-Dichloropropane	5	5	0	0
Bromodichloromethane	5	5	0	0
Cis-1,3-Dichloropropene	5	5	0	0
4-Methyl-2-pentanone (MIBK)	5	0	3	2
Toluene	5	5	0	0
Trans-1,3-Dichloropropene	5	0	0	5
1,1,2-Trichloroethane	5	5	0	0
Tetrachloroethene	5	0	5	0
2-Hexanone	5	5	0	0
Dibromochloromethane	5	5	0	0
1,2-Dibromoethane (EDB)	5	5	0	0
Chlorobenzene	5	5	0	0
Ethylbenzene	5	0	0	5
Xylenes (total)	5	0	0	5
Styrene	5	3	2	0
Bromoform	5	5	0	0
1,1,2,2-Tetrachloroethane	5	5	0	0
Benzyl chloride	5	5	0	0
4-Ethyltoluene	5	0	0	5
1,3,5-Trimethylbenzene	5	0	5	0
1,2,4-Trimethylbenzene	5	0	0	5
1,3-Dichlorobenzene	5	5	0	0
1,4-Dichlorobenzene	5	0	5	0
1,2-Dichlorobenzene	5	5	0	0
1,2,4-Trichlorobenzene	5	5	0	0
Hexachlorobutadiene	5	5	0	0
Total	**245**	**158**	**51**	**36**

LANDFILL GAS SURFACE EMISSIONS

Methane emissions were measured on a twice-quarterly basis using a CEC-Landtec SEM-500 field instrument. Surface concentrations were monitored around the perimeter of the collection area and along a pattern that traversed the landfill at 30m intervals and where visual observations indicated elevated concentrations of landfill gas. Emissions were monitored and recorded separately for Unit 5 and 7.

The climatic conditions and the background methane concentration up and downwind were recorded for each sampling event. Background concentrations averaged 8.4 ppm upwind and 11.8 ppm downwind for Unit 5, and 5.0 ppm upwind and 8.2 ppm downwind for Unit 7, for the period December 2001 to July 2003.

Permit requirements necessitate a methane concentration greater than 500ppm above the measured background level to be marked, adjustments made to reduce the surface emissions at that location, and the location to be reanalyzed within 10 days. If an exceedance exists on reanalysis, additional adjustments and/or cover maintenance must be performed and the location reanalyzed within 10 days. On a third exceedance, the Air Pollution Control District (APCD) must be notified, and either a new well installed within 120 days of the initial exceedance, or an alternative remedy submitted for approval to the APCD.

During the period from December 2001 to July 2003, Unit 5 recorded the following permit response actions:

- Reported three occasions of exceedances which were resolved within 10 days via adjustment of the gas collection system;
- Five locations where additional soil cover was added; and
- Installation of one new gas collection well.

During the same monitoring period, Unit 7 recorded the following permit response actions:

- Seven locations where additional soil cover was added; and
- One occasion that required maintenance of the leachate risers to resolve the issue.

MOISTURE BALANCE

The moisture balance within the landfill is dependent on several factors, not all of which are known precisely. In conventional landfills, the primary moisture sources are precipitation and storm water runoff, along with other additions such leachate recirculation, LFG condensate, and waste moisture. The rate of percolation through the landfill, and ultimately the volume of leachate generated, is dependent in part on the nature of waste in the landfill and its field capacity. A moisture balance analysis will be performed for each of the test cells in the Final Report of this research investigation.

FUGITIVE GAS EMISSIONS

The AALB was found to have 160 g/s of methane, while the FLB unit was 39 g/s of methane. The AALB estimate is considered to be conservative since complete capture of the entire plume was not possible. Additional sampling is being conducted and will be combined with the September 2002 results. An overview of the fugitive gas emissions study is included in Appendix D.